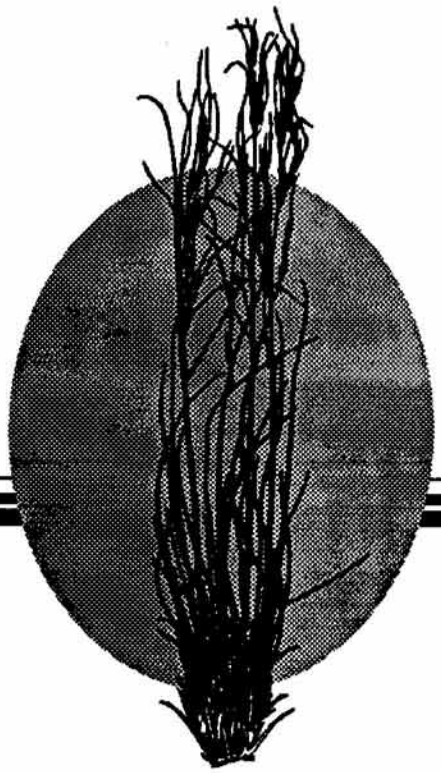
Chapter 1

Proposed Action and Alternatives



CHAPTER 1

PROPOSED ACTION AND ALTERNATIVES

INTRODUCTION

The Bureau of Land Management (BLM), U.S. Department of the Interior (USDI), proposes treatment of vegetation on public lands in 13 Western States. Some of the treatment methods have the potential for significant impacts on the environment. This final environmental impact statement (FEIS) analyzes potential impacts on the natural and human environment that may occur as a result of the proposed action and alternatives.

This FEIS is presented in five chapters and fourteen appendixes (Figure 1-1). This chapter first identifies the purpose and need to which BLM is responding in proposing vegetation treatment, including the legal authorities under which the action is being proposed, and then describes BLM's requirement to prepare this programmatic document. This is followed by summaries of the proposed treatment program and alternative programs, the treatment methods that would be used in each program, and the environmental impacts. The implementation of this final EIS and the relationship of this vegetation treatment action to other Federal and State actions and to the private sector are then described. The final section discusses the limitations of this document.

Acreage figures shown are for analysis purposes only. There are various factors such as funding, available manpower, and need for treatment that will affect the number of acres treated.

The BLM will not exceed the acres projected in Tables 1-1 through 1-6 on an average annual basis over the life of the EIS. Several factors may cause a reduction or increases in acreage in any given year, such as available funds, other workloads, revised land use planning, Threatened and Endangered species conflicts, cultural and visual resources and management concerns.

Chapter 2 describes the physical and biological characteristics of areas in the 13 Western States that could be affected by a vegetation treatment program. Chapter 3 presents the impacts on these physical and biological characteristics that are likely to occur with the implementation of any of the treatment alternatives. Public participation in the development of this final EIS is described in Chapter 4. Chapter 5 lists the preparers and reviewers.

The first six appendixes provide supporting and additional background information: a glossary (Appendix A), comments received during public scoping (Appendix B); description of the nonchemical treatment methods (Appendix C); detailed results of the prescribed burning (Appendix D); herbicide risk assessments (Appendix E); and the fire ecology of western plants (Appendix F). Appendixes G, H, and I list the common and scientific names of plant and animal species, special status species, and target species, respectively. References for BLM program direction concerning the use of renewable resource improvements are included as Appendix J. Each person, organization, or agency that provided written comments are listed in Appendix K. Appendix L is the distribution list for the draft EIS. Appendix M is a list of herbicide formulations, and copies of the Federal Noxious Weed Control Laws are shown in Appendix N.

PURPOSE AND NEED FOR ACTION

Program Objectives

A key objective of the Vegetative Treatment Program is to increase soil stability, improve quality and sustained yield of water, reduce the spread of noxious weeds, and increase desired plant species to meet objectives of the land use plans (LUPs). Vegetative treatments will be done with the utmost concern for human health and safety. Vegetative treatment needs arise for many different conditions and purposes.

A prescription for the management and use of an area (such as the provision of habitat for wildlife and livestock use) may require that certain desired vegetation attributes that do not currently exist be developed. For example, a vegetation community with a sagebrush canopy cover exceeding 50 percent may not be desirable because of suppression of herbaceous understory species. The same community with a 10- to 15-percent canopy cover may be highly desirable because it has ample herbaceous understory production and still provides nesting cover for song birds and sage grouse, as well as winter forage for herbivores.

The proposed vegetation treatment program is needed to respond to many different plant control requirements, including suppressing plants that are toxic to humans and animals, enhancing visibility, maintaining passages for transportation, facilitating drainage, reducing fuel for wildfires, and controlling

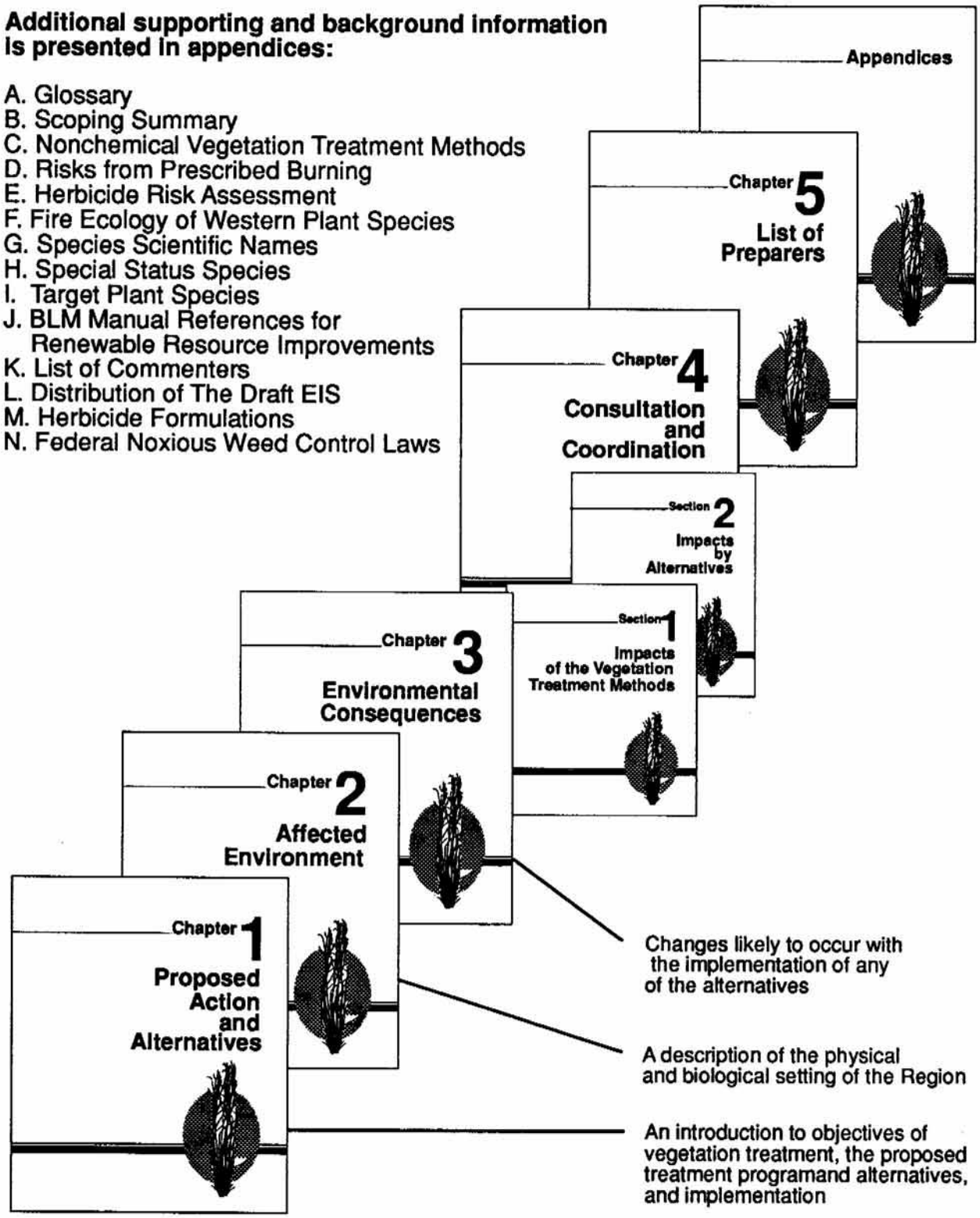


Figure 1-1
How This EIS is Organized

Table 1-1

Estimated Average Annual Acres Treated by Program Alternative and Treatment Method

Figures include acres to be treated during the next 10 - 15 years (pending availability of funds) on all BLM Lands including Rangelands, Rights-of-way. Oil and Gas leases, Public Domain Forest Lands and developed Recreation Lands.

Treatment Method	Proposed Action: Alternative 1	No Aerial Application of Herbicides: Alternative 2	No Use of Herbicides Alternative 3	No Prescribed Burning: Alternative 4	No Action: Alternative 5
Manual					
Cutting	10,310	10,310	10,010	9,910	8,745
Pulling	605	530	480	430	475
Scalping	2,575	2,750	2,800	2,750	2,930
Mulching	580	580	580	580	620
Total Manual	**14,070**	**14,170**	**13,870**	**13,670**	**12,770**
Mechanical					
Chaining	13,750	22,350	22,950	19,650	10,890
Tilling	27,200	30,100	31,700	30,800	13,385
Mowing	7,435	8,735	9,235	9,035	6,630
Cutting	1,800	1,950	2,150	2,050	1,635
Roller Chopping	3,300	3,300	3,400	3,300	0
Bulldozing	400	500	500	100	400
Grubbing	500	500	500	500	160
Blading	800	800	800	800	810
Drilling	2,930	2,930	2,980	2,930	8,035
Total Mechanical	**58,115**	**71,165**	**74,215**	**69,165**	**41,945**
Biological					
Grazing	56,225	56,225	56,225	56,225	53,925
Insects	3,750	3,650	3,750	3,750	3,710
Pathogens	200	200	200	200	0
Total Biological	**60,175**	**60,075**	**60,175**	**60,175**	**57,635**
Total Prescribed Burning[1]	**97,765**	**132,290**	**136,390**	**0**	**92,680**
Chemical					
Aerial					
Helicopter	55,975	0	0	94,740	1,395
Fixed-Wing Aircraft	58,700	0	0	46,000	24,370
Ground					
Vehicle	21,045	38,033	0	28,075	9,615
Hand	5,795	7,135	0	6,545	2,095
Total Chemical	**141,515**	**45,168**	**0**	**175,360**	**37,475**
GRAND TOTAL	**371,640**	**322,868**	**284,650**	**318,370**	**242,505**

[1] An estimated 25% of the prescribed burn acreage is a follow-up treatment to chaining or spraying. Thus, total treated acreage would be reduced accordingly.

Table 1-2

Estimated Average Annual Acres Treated by State
Alternative 1

	Arizona	Colorado	Idaho	Montana, North Dakota & South Dakota	Nevada	New Mexico & Oklahoma	Oregon & Washington	Utah	Wyoming	TOTAL
Manual										
Cutting	50	1,100	1,400	320	6,505	100	65	600	170	10,310
Pulling	0	0	175	100	55	100	175	0	0	605
Scalping	0	0	125	200	50	100	2,000	0	100	2,575
Mulching	0	0	0	200	0	0	0	0	380	580
Total Manual	**50**	**1,100**	**1,700**	**820**	**6,610**	**300**	**2,240**	**600**	**650**	**14,070**
Mechanical										
Chaining	2,000	100	5,400	300	500	300	100	4,900	150	13,750
Tilling	1,600	1,300	15,550	2,790	1,200	0	360	3,700	700	27,200
Mowing	600	0	1,100	1,400	300	100	585	2,600	750	7,435
Cutting	50	1,000	250	180	0	0	340	0	0	1,820
Roller Chopping	0	0	3,200	0	0	0	0	100	0	3,300
Bulldozing	0	300	0	0	100	0	0	0	0	400
Grubbing	0	0	0	0	0	500	0	0	0	500
Blading	0	0	0	0	0	0	0	0	800	800
Drilling Seed	0	1,500	0	1,360	0	0	0	50	0	2,910
Total Mechanical	**4,250**	**4,200**	**25,500**	**6,030**	**2,100**	**900**	**1,385**	**11,350**	**2,400**	**58,115**
Biological										
Grazing	0	100	2,300	48,400	0	0	5,425	0	0	56,225
Insects	0	100	0	3,100	0	0	300	200	50	3,750
Pathogens	0	0	0	200	0	0	0	0	0	200
Total Biological	**0**	**200**	**2,300**	**51,700**	**0**	**0**	**5,725**	**200**	**50**	**60,175**
Total Prescribed Burning	**9,300**	**8,150**	**34,075**	**1,400**	**2,000**	**6,100**	**15,240**	**6,200**	**15,300**	**97,765**
Chemical										
Aerial										
Helicopter	5,300	200	3,225	1,400	10,000	1,000	32,550	2,000	300	55,975
Fixed Wing	0	1,000	19,700	0	3,000	31,000	0	3,300	700	58,700
Ground										
Vehicle	2,100	600	1,340	2,205	500	1,400	3,800	4,400	4,700	21,045
Hand	800	500	380	905	200	400	1,010	400	1,200	5,795
Total Chemical	**8,200**	**2,300**	**24,645**	**4,510**	**13,700**	**33,800**	**37,360**	**10,100**	**6,900**	**141,515**
Treatment Total	**21,800**	**15,950**	**88,220**	**64,460**	**24,410**	**41,100**	**61,950**	**28,450**	**25,300**	**371,640**
TOTAL BLM ADMINISTERED LANDS[1]	**12,428,584**	**8,276,890**	**11,867,773**	**8,417,283**	**47,062,636**	**12,872,729**	**13,745,487**	**22,141,908**	**18,404,034**	**156,117,324**

[1] Figures were taken from U.S. Department of the Interior, Bureau of Land Management, Public Land Statistics, 1989 edition; Eastern Oregon and Washington figures are only that area addressed in this EIS.

Table 1-3

Estimated Average Annual Acres Treated by State
Alternative 2

	Arizona	Colorado	Idaho	Montana, North Dakota & South Dakota	Nevada	New Mexico & Oklahoma	Oregon & Washington	Utah	Wyoming	TOTAL
Manual										
Cutting	50	1,100	1,400	320	6,505	100	65	600	170	10,310
Pulling	0	0	0	100	55	100	175	100	0	530
Scalping	0	0	300	200	50	100	2,000	0	100	2,750
Mulching	0	0	0	200	0	0	0	0	380	580
Total Manual	**50**	**1,100**	**1,700**	**820**	**6,610**	**300**	**2,240**	**700**	**650**	**14,170**
Mechanical										
Chaining	2,000	100	6,500	300	1,000	4,700	2,700	4,900	150	22,350
Tilling	1,600	1,400	15,700	2,790	2,300	0	1,910	3,700	700	30,100
Mowing	600	0	1,300	1,400	300	100	1,135	3,150	750	8,735
Cutting	50	1,000	400	160	0	0	340	0	0	1,950
Roller Chopping	0	0	3,200	0	0	0	0	100	0	3,300
Bulldozing	0	400	0	0	100	0	0	0	0	500
Grubbing	0	0	0	0	0	500	0	0	0	500
Blading	0	0	0	0	0	0	0	0	800	800
Drilling Seed	0	1,500	0	1,380	0	0	0	50	0	2,930
Total Mechanical	**4,250**	**4,400**	**27,100**	**6,030**	**3,700**	**5,300**	**6,085**	**11,900**	**2,400**	**71,165**
Biological										
Grazing	0	100	2,300	48,400	0	0	5,425	0	0	56,225
Insects	0	100	0	3,100	0	0	300	100	50	3,650
Pathogens	0	0	0	200	0	0	0	0	0	200
Total Biological	**0**	**200**	**2,300**	**51,700**	**0**	**0**	**5,725**	**100**	**50**	**60,075**
Total Prescribed Burning	**12,000**	**8,150**	**37,000**	**1,400**	**3,000**	**8,600**	**38,740**	**8,000**	**15,400**	**132,290**
Chemical										
Aerial										
Helicopter	0	0	0	0	0	0	0	0	0	0
Fixed-Wing	0	0	0	0	0	0	0	0	0	0
Ground										
Vehicle	4,300	700	12,650	2,675	3,000	3,000	5,500	1,508	4,700	38,033
Hand	800	600	1,220	1,105	200	400	1,010	600	1,200	7,135
Total Chemical	**5,100**	**1,300**	**13,870**	**3,780**	**3,200**	**3,400**	**6,510**	**2,108**	**5,900**	**45,168**
Treatment Total	**21,400**	**15,150**	**81,970**	**63,730**	**16,510**	**17,600**	**59,300**	**22,808**	**24,400**	**322,868**
TOTAL BLM ADMINISTERED LANDS[1]	**12,428,584**	**8,276,890**	**11,867,773**	**8,417,283**	**47,062,636**	**12,872,729**	**13,745,487**	**22,141,908**	**18,404,034**	**156,117,324**

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Table 1-4

Estimated Average Annual Acres Treated by State
Alternative 3

	Arizona	Colorado	Idaho	Montana, North Dakota & South Dakota	Nevada	New Mexico & Oklahoma	Oregon & Washington	Utah	Wyoming	TOTAL
Manual										
Cutting	50	1,100	1,400	320	6,505	200	65	200	170	10,010
Pulling	0	0	0	100	105	100	175	0	0	480
Scalping	0	0	300	200	100	100	2,000	0	100	2,800
Mulching	0	0	0	200	0	0	0	0	380	580
Total Manual	**50**	**1,100**	**1,700**	**820**	**6,710**	**400**	**2,240**	**200**	**650**	**13,870**
Mechanical										
Chaining	2,000	200	6,500	300	1,000	4,700	3,200	4,900	150	22,950
Tilling	2,700	1,400	15,700	2,790	2,500	0	2,210	3,700	700	31,700
Mowing	800	0	1,300	1,400	300	400	1,135	3,150	750	9,235
Cutting	50	1,000	400	160	0	200	340	0	0	2,150
Roller Chopping	0	0	3,200	0	0	0	0	200	0	3,400
Bulldozing	0	400	0	0	100	0	0	0	0	500
Grubbing	0	0	0	0	0	500	0	0	0	500
Blading	0	0	0	0	0	0	0	0	800	800
Drilling Seed	0	1,500	0	1,380	0	0	0	100	0	2,980
Total Mechanical	**5,550**	**4,500**	**27,100**	**6,030**	**3,900**	**5,800**	**6,885**	**12,050**	**2,400**	**74,215**
Biological										
Grazing	0	100	2,300	48,400	0	0	5,425	0	0	56,225
Insects	0	100	0	3,100	0	0	300	200	50	3,750
Pathogens	0	0	0	200	0	0	0	0	0	200
Total Biological	**0**	**200**	**2,300**	**51,700**	**0**	**0**	**5,725**	**200**	**50**	**60,175**
Total Prescribed Burning	**12,400**	**8,150**	**38,000**	**1,400**	**4,500**	**8,600**	**39,740**	**8,000**	**15,600**	**136,390**
Chemical										
Aerial										
Helicopter	0	0	0	0	0	0	0	0	0	0
Fixed Wing	0	0	0	0	0	0	0	0	0	0
Ground										
Vehicle	0	0	0	0	0	0	0	0	0	0
Hand	0	0	0	0	0	0	0	0	0	0
Total Chemical	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Treatment Total	**18,000**	**13,950**	**69,100**	**59,950**	**15,110**	**14,800**	**54,590**	**20,450**	**18,700**	**284,650**
TOTAL BLM ADMINISTERED LANDS[1]	**12,428,584**	**8,276,890**	**11,867,773**	**8,417,283**	**47,062,636**	**12,872,729**	**13,745,487**	**22,141,908**	**18,404,034**	**156,117,324**

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Table 1-5

Estimated Average Annual Acres Treated by State
Alternative 4

	Arizona	Colorado	Idaho	Montana, North Dakota & South Dakota	Nevada	New Mexico & Oklahoma	Oregon & Washington	Utah	Wyoming	TOTAL
Manual										
Cutting	50	1,100	1,400	320	6,505	100	65	200	170	9,910
Pulling	0	0	0	100	55	100	175	0	0	430
Scalping	0	0	300	200	50	100	2,000	0	100	2,750
Mulching	0	0	0	200	0	0	0	0	380	580
Total Manual	**50**	**1,100**	**1,700**	**820**	**6,610**	**300**	**2,240**	**200**	**650**	**13,670**
Mechanical										
Chaining	2,100	200	5,000	300	1,000	300	3,200	7,400	150	19,650
Tilling	2,200	1,400	15,600	2,790	1,300	0	2,210	4,600	700	30,800
Mowing	500	0	1,300	1,400	300	100	1,135	3,550	750	9,035
Cutting	50	1,000	400	160	0	100	340	0	0	2,050
Roller Chopping	0	0	3,200	0	0	0	0	100	0	3,300
Bulldozing	0	0	0	0	100	0	0	0	0	100
Grubbing	0	0	0	0	0	500	0	0	0	500
Blading	0	0	0	0	0	0	0	0	800	800
Drilling Seed	0	1,500	0	1,380	0	0	0	50	0	2,930
Total Mechanical	**4,850**	**4,100**	**25,500**	**6,030**	**2,700**	**1,000**	**6,885**	**15,700**	**2,400**	**69,165**
Biological										
Grazing	0	100	2,300	48,400	0	0	5,425	0	0	56,225
Insects	0	100	0	3,100	0	0	300	200	50	3,750
Pathogens	0	0	0	200	0	0	0	0	0	200
Total Biological	**0**	**200**	**2,300**	**51,700**	**0**	**0**	**5,725**	**200**	**50**	**60,175**
Total Prescribed Burning	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Chemical										
Aerial										
Helicopter	14,000	200	15,300	1,400	11,000	1,000	48,340	2,500	1,000	94,740
Fixed-Wing	0	1,000	0	0	3,000	33,000	0	4,000	5,000	46,000
Ground										
Vehicle	2,100	700	8,200	2,175	500	1,400	5,500	4,400	3,100	28,075
Hand	800	300	1,220	915	300	400	1,010	500	1,100	6,545
Total Chemical	**16,900**	**2,200**	**24,720**	**4,490**	**14,800**	**35,800**	**54,850**	**11,400**	**10,200**	**175,360**
Treatment Total	**21,800**	**7,600**	**54,220**	**63,040**	**24,110**	**37,100**	**69,700**	**27,500**	**13,300**	**318,370**
TOTAL BLM ADMINISTERED LANDS[1]	**12,428,584**	**8,276,890**	**11,867,773**	**8,417,283**	**47,062,636**	**12,872,729**	**13,745,487**	**22,141,908**	**18,404,034**	**156,117,324**

[1] Figures were taken from U.S. Department of the Interior, Bureau of Land Management, Public Land Statistics, 1989 edition; Eastern Oregon and Washington figures are only that area addressed in this EIS.

Table 1-6

Estimated Average Annual Acres Treated by State
Alternative 5

	Arizona	Colorado	Idaho	Montana, North Dakota & South Dakota	Nevada	New Mexico & Oklahoma	Oregon & Washington	Utah	Wyoming	TOTAL
Manual										
Cutting	50	1,025	10	320	6,505	50	65	550	170	8,745
Pulling	0	0	0	100	55	100	175	45	0	475
Scalping	0	10	480	190	50	100	2,000	0	100	2,930
Mulching	0	40	0	200	0	0	0	0	380	620
Total Manual	**50**	**1,075**	**490**	**810**	**6,610**	**250**	**2,240**	**595**	**650**	**12,770**
Mechanical										
Chaining	2,000	500	0	150	600	425	3,200	3,865	150	10,890
Tilling	1,600	0	2,400	2,430	1,200	0	2,210	2,845	700	13,385
Mowing	600	0	100	1,210	300	85	535	3,050	750	6,630
Cutting	50	1,000	160	85	0	0	340	0	0	1,635
Roller Chopping	0	0	0	0	0	0	0	0	0	0
Bulldozing	0	200	100	0	100	0	0	0	0	400
Grubbing	0	0	160	0	0	0	0	0	0	160
Blading	0	0	10	0	0	0	0	0	800	810
Drilling Seed	0	1,500	4,510	1,380	600	0	0	45	0	8,035
Total Mechanical	**4,250**	**3,200**	**7,440**	**5,255**	**2,800**	**510**	**6,285**	**9,805**	**2,400**	**41,945**
Biological										
Grazing	0	100	0	48,400	0	0	5,425	0	0	53,925
Insects	0	100	110	3,100	0	0	300	100	0	3,710
Pathogens	0	0	0	0	0	0	0	0	0	0
Total Biological	**0**	**200**	**110**	**51,500**	**0**	**0**	**5,725**	**100**	**0**	**57,635**
Total Prescribed Burning	**9,300**	**8,470**	**8,650**	**350**	**3,500**	**1,500**	**39,740**	**5,870**	**15,300**	**92,680**
Chemical										
Aerial										
Helicopter	0	0	0	0	0	0	0	1,095	300	1,395
Fixed Wing	0	0	0	0	0	21,000	0	2,670	700	24,370
Ground										
Vehicle	0	100	0	675	0	900	0	3,240	4,700	9,615
Hand	0	100	0	195	0	100	0	500	1,200	2,095
Total Chemical	**0**	**200**	**0**	**870**	**0**	**22,000**	**0**	**7,505**	**6,900**	**37,475**
Treatment Total	**13,600**	**13,145**	**16,690**	**58,785**	**12,910**	**24,260**	**53,990**	**23,875**	**25,250**	**242,505**
TOTAL BLM ADMINISTERED LANDS[1]	**12,428,584**	**8,276,890**	**11,867,773**	**8,417,283**	**47,062,636**	**12,872,729**	**13,745,487**	**22,141,908**	**18,404,034**	**156,117,324**

[1] Figures were taken from U.S. Department of the Interior, Bureau of Land Management, Public Land Statistics, 1989 edition; Eastern Oregon and Washington figures are only that area addressed in this EIS.

the expansion of exotic species, which includes noxious weeds, that may invade adjacent agriculture or pasture lands. (Other specific needs are addressed in the Program Areas section.)

Vegetation treatments which benefit livestock forage most always generate additional benefits such as increased big and small game production, increased hunter days, reduced soil erosion, and improved water quality such as reduced salinity. It is BLM's policy to develop cost effective range improvements which will result in a favorable return on the funds invested. It is policy to consider all costs and all benefits to the extent they can be quantified.

BLM is proposing a holistic approach based on the vegetation management needs as identified in site specific land use plans. The overall productivity of public lands can be improved for wildlife, watershed, recreation, and livestock forage through the proper management and manipulation of vegetation.

Many natural ecosystems have been altered as a result of man's presence. Introduction of non-native species such as noxious weeds and suppression of naturally occurring fires have also altered many ecosystems along with heavy grazing by both livestock and wildlife. Due to these influences holistic management must include land treatment in order to meet land use plan objectives.

BLM proposes to implement a vegetation treatment program on 372,000 acres annually in Arizona, Colorado, Idaho, Montana, Nevada, New Mexico, North Dakota, Oklahoma, eastern Oregon, South Dakota, Utah, Washington, and Wyoming (Figure 1-2). The impacts of BLM's program to manage vegetation in California and western Oregon were addressed in separate EIS documents (BLM 1989a, BLM 1989b) and therefore are not analyzed here.

The main benefit of noxious weed control on public lands is not only the prevention of economic losses related to activities on these lands, but the prevention of economic losses sustained on nearby private lands that result when uncontrolled weed infestations on public lands spread to infest and reinfest the private lands.

Because of the detrimental effects of some noxious weeds on animals and humans, no control in some instances encourages hazard and economic losses as is emphasized in the Federal Noxious Weed Act (PL 93-629), which states that distribution of noxious weeds "... allows the growth and spread of such weeds which cause disease or have other adverse effects on man or his environment, therefore, is detrimental to the agriculture and commerce of the United States and to the public health." According to the National Academy of Sciences (1968), an estimated 75,000 people suffer poisoning by plants annually.

Chemical and biological treatment for the control of noxious weeds can be effective tools for treating non-grazing lands. Some of the most serious noxious weed problems on public lands are found in areas where no grazing occurs. These include highway rights-of-way, railroads, recreation sites, riparian exclosures, oil and gas drill sites and related transmission facilities, and any area where surface disturbing activities have occurred, such as wildfires.

Noxious weeds have become established and are rapidly spreading on both public and private rangeland, woodlands and farm land (Forcella and Harvey, 1981; Messersmith and Lym, 1983; Bucher, 1984; French and Lacey, 1983). As a result, crop yields are being reduced, rangeland in good ecological condition is being invaded, and wildlife habitat is being reduced (Chase, 1985; Bucher, 1984; Kelsey, 1984; Morris and Bedunah, 1984; Penhallegon, 1983). Economic loss from noxious weeds is considerable and costs millions of dollars annually in each state in the EIS area, posing a serious menace to the public welfare and the state's economic stability (Kelsey, 1984; Jenson, 1984; Bucher, 1984; Chase, 1985; Lewiston Morning Tribune, 1980; Baker, 1983; Nielson, 1978; Thompson and others, 1990). Noxious weeds cannot be adequately controlled unless federal, state, county and private interests work together in controlling weeds using effective and efficient means (Lacey and Fay, 1984; French, 1984; Hahnkamp and Pence, 1984; Ali, 1984).

Many noxious weeds are spread by recreational vehicles, geophysical equipment, campers, backpackers, hunters, big game and non-game species, as well as by livestock. With more and more use of the public lands, noxious weeds will spread into many areas including wilderness. Some species, such as the thistles and knapweeds, will cause these areas to become highly undesirable due to the weed problems which occur. Also, many of the introduced species of the noxious weeds are a very significant threat to agricultural croplands, as a result of their competitive nature.

The proposed program, an expansion of the existing Integrated Pest Management (IPM) program, would allow the use of manual, mechanical, biological, prescribed burning, or chemical treatments on more acres than are now being treated. IPM is the selection, integration, and implementation of treatment methods based on predicted ecologic, sociologic, and economic effects (BLM 1981a). Three of the alternatives to the proposed program restrict or eliminate the use of one of the treatment methods: no aerial application of herbicides, no use of herbicides, and no prescribed burning. Continuation of the existing management program is the final alternative considered in this document.

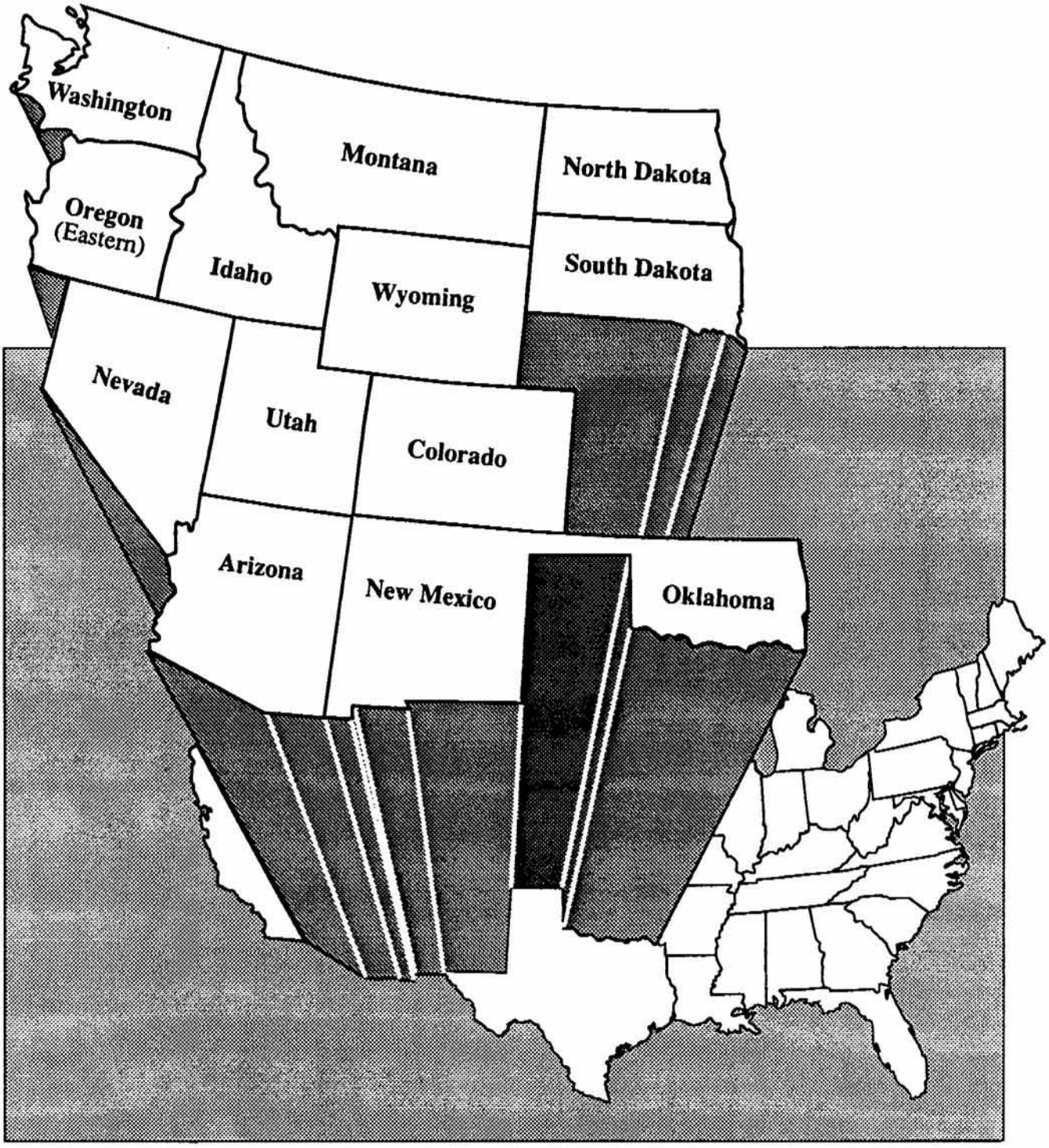


Figure 1-2
States included in the Vegetation Treatment Program

Concerns about using prescribed burning were raised during public scoping (see Public Involvement Section, and Appendix B); consequently, BLM added a no-prescribed-burning program alternative. Analysis of a no action alternative, a continuation of the current program, is required under 40 CFR Part 1502.14(d). No change from current management is considered to be the appropriate no action alternative when ongoing programs initiated under existing legislation and regulations will continue (46 CFR 18027). No aerial application of herbicides and no use of herbicides have been assessed because of continuing concerns about possible health effects and environmental damage from the use of herbicides.

Legal Mandates for the Program

BLM is required to manage public lands and their resources by the Federal Land Policy and Management Act of 1976 (43 U.S.C. 1700 et seq.). This law established policy for BLM administration of public lands under its jurisdiction. The Taylor Grazing Act of 1934 (43 U.S.C. 315 et seq.) introduced Federal protection and management of public lands by regulating grazing on public lands. The Public Rangelands Improvement Act of 1978 (43 U.S.C. 1901 et seq.) required BLM to manage, maintain, and improve the public lands suitable for livestock grazing so that they become as productive as feasible. Two Federal laws direct weed control on Federal lands: the Federal Noxious Weed Act of 1974 (7 U.S.C. 2801-2813), as amended by Sec. 15, Management of Undesirable Plants on Federal Lands, 1990, and the Carson-Foley Act of 1968 (PL 90-583).

State and county laws commonly place responsibility for noxious weed control on Federal land with the Federal Government. BLM will comply with the individual States' noxious weed management acts.

NEPA Requirements of the Program

Federal agencies are required by the National Environmental Policy Act of 1969 (NEPA) (42 U.S.C. 4321 et seq.), as amended, to prepare an EIS if a proposed action has a potential for significant environmental impacts (Figure 1-3). In accordance with NEPA, this final EIS identifies impacts of the proposed vegetation treatment program and four alternative programs. It may be used as a broad, comprehensive background source on which any necessary subsequent environmental analyses can be tiered, in accordance with the Council on Environmental Quality's (CEQ) procedures for implementing NEPA (40 CFR 1500-1508). Tiering eliminates repetitive discussions of the same issues and allows consideration of the actual issues that are relevant for decision at each level of environmental review.

The intent of this final EIS is to comply with NEPA and the courts by assessing the program impacts of treating undesired vegetation species; the necessity for treatment would be determined by BLM's land-use plans. This final EIS will also be used to facilitate analysis of the treatment alternatives in the land-use planning process and implementation of BLM's land-use decisions. The treatment methods assessed in this final EIS would be available for use at the local level to accomplish local land-use plan objectives.

Future environmental analyses of vegetation treatment will be conducted at the project level and will focus on resources that are unique to specific sites, as necessary. BLM field offices will be responsible for preparing site-specific environmental assessments as needed.

Several recent EISs are relevant to the issues addressed in this final EIS and have been used for reference: Northwest Area Noxious Weed final EIS and Supplement (BLM 1985a, 1987a), Western Oregon Management of Competing Vegetation final EIS (BLM 1989b), California Vegetation Management final EIS (BLM 1989a), Vegetation Management in the Coastal Plain/Piedmont final EIS (USDA 1989), Pacific Northwest Management of Competing and Unwanted Vegetation final EIS (USDA 1988), and Eradication of Cannabis on Federal Lands in the Continental United States final EIS (DEA 1985). This programmatic EIS is prepared to address NEPA compliance for those States not previously covered in EISs for vegetation treatment programs by BLM.

The CEQ Regulations for Implementing the Procedural Provisions of NEPA (40 CFR Parts 1500-1508) and USDI manuals (USDI n.d., BLM 1988a) provide additional guidance for NEPA compliance and for the content and format of this final EIS.

Public Involvement

Public involvement is recognized as an essential element in the development of an EIS and achieving a successful program for the management of public lands and natural resources. When the decision was made to complete this vegetation treatment EIS, a public participation and coordination plan was developed. Public participation continues after the document is complete and used for site-specific and project-level planning.

Following BLM's decision to proceed with this programmatic vegetation treatment EIS, a Notice of Intent was issued on July 17, 1988. The scoping period in most States ended August 19, 1988; scoping

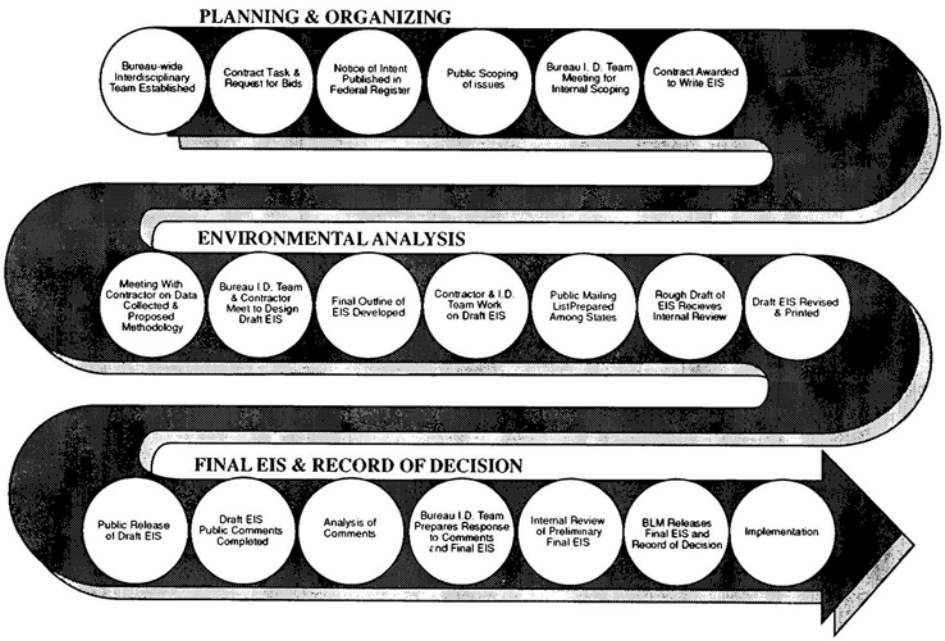


Figure 1-3
The Process

in Colorado, Montana, North Dakota, and South Dakota ended September 30, 1988.

Four areas of concern were identified through the scoping process: (1) the safety and accuracy of aerially applied herbicides; (2) any use of herbicides, regardless of the application method; (3) the potential impacts brought about by the alteration of natural ecological systems, regardless of the vegetation treatment method; and (4) concerns about prescribed burning. (Scoping is further discussed in Appendix B.)

Program Areas

Rangeland, public domain forest land, oil and gas production facility sites, rights-of-way, and recreation and cultural area treatments would be included in the program to treat a number of noxious weeds and undesirable plant species (Appendix I). These vegetation treatments would be made to facilitate sound resource management practices. This FEIS addresses the impacts of proposed noxious weed treatments for the first time in Arizona, Colorado, Nevada, New Mexico, North Dakota, Oklahoma, South Dakota, and Utah; treatment of noxious weeds in the other five States was analyzed in an earlier EIS (BLM 1985a). Vegetation treatments for this EIS analysis are described in the following sections.

Rangeland Treatments

Rangeland treatments would be made to achieve desired range conditions, increase forage production for livestock and wildlife, create stratified age structure dynamics in brushlands and chaparral for wildlife habitat improvement and fuel hazard reduction, increase habitat diversity, and improve watershed conditions. Vegetation treatment programs also would be directed toward controlling undesired plant species in riparian zones, suppressing plants toxic to wildlife and domestic livestock, and controlling the expansion of exotic species that threaten native species and may invade adjacent agricultural and pasture lands.

Public Domain Forest Land Treatments

Public domain forest land treatments would be designed to meet a variety of multiple-use objectives, many of which are generally similar to objectives for rangeland treatments. These include reducing plant competition to enhance the growth of desired timber species and the growth of plant species that provide shelter and food for wildlife, restoring the ecological role of prescribed fire in the forest system to stimulate reproduction of certain species, removing noncommercial trees, and managing vegetation that could serve as fuel for wildfires.

Oil and Gas Site Treatments

Oil and gas drilling and production site operations frequently involve site disturbance, which often results in invasion of noxious weeds and other undesired vegetation. The goal of oil and gas site treatments is to control noxious weeds and vegetation that may pose a safety or fire hazard. Vegetation treatments include the preparation and regular maintenance of areas for use as fire control lines or fuel breaks, or the reduction of vegetation species that could pose a hazard to fire control operations.

Right-of-Way Treatments

Treatments for road, railroad, trail, waterway, utility rights-of-way, and communication sites are necessary to suppress vegetation that restricts vision or presents a safety or fire hazard. In roadside maintenance, vegetation is removed or retarded from ditches and shoulders to prevent brush encroachment into driving lanes, maintain visibility on curves for the safety of vehicle operators, permit drainage structures to function as intended, and facilitate maintenance operations. Railroad rights-of-way treatments are important for public safety, employee safety, drainage, inspections, fire prevention and communication lines and signals. In addition, poisonous plants on unfenced lands would be treated to protect the health of livestock.

Some of the reasons for using chemical vegetation control on railroad rights-of-ways include:

1. High standards of vegetation control are important in maintaining a safe operating environment for the railroads. Preemergence and postemergence herbicides are the primary means use for preventing or controlling young emerged vegetation, **before** it becomes a safety hazard. Alternative methods, such as burning or mechanical control, present for greater risk to railroad employees and the general public, and pose a hazard to existing facilities.
2. Pre-emergence herbicides, which prevent the emergence of vegetation for the length of a growing season, are a particularly important tool for railroad vegetation management. Each time a piece of equipment occupies track limits, this may slow the movement of other freight.

Recreation and Cultural Area Treatments

Recreation and cultural area treatments would be directed toward maintaining the appearance of

these areas, reducing potential threats to the sites' plants and wildlife, and protecting visitors from adverse health effects of poisonous or harmful plants. Treatments also would be made to reduce vegetation that could serve as fuel for wildfires, as well as to establish fire-resistant and fire-resilient species in these areas.

Weed Management Treatments and Design Features

The purpose of this section is to discuss preventive measures, treatment methods, and protective measures (design features) that would be used in a noxious weed management program. Some acres may receive one or more treatments in combination, including such treatment combinations as herbicide application and burning, grazing and herbicide application, and grazing and use of insects or pathogens. Treatment would have to be repeated in most situations.

Pretreatment surveys would be conducted in accordance with BLM Manual 9011 and Handbook 9011-1 before a decision is made to use herbicides on a specific tract. Such surveys would involve consideration of all feasible treatments, including potential impacts, effectiveness, and cost. Information from such surveys would be used as a basis for prescribing noxious weed treatments.

Special provisions for treatments would be selected according to the scope of the action, accepted mitigation, and the physical characteristics of the specific site. BLM manuals, manual supplements, and field guides provide a variety of approved standard and special provisions. These provisions are updated periodically as pre- and post-treatment analysis finds a need for change. BLM will assure that noxious weed infestations are noted and considered during appraisals of any land proposed for exchange or sale.

Before any vegetation treatment or ground disturbance, BLM policy requires a survey of the project site for plants and animals listed or proposed for listing as theatened, endangered, and sensitive species (see Appendix H). If a project might affect any listed or proposed federal threatened or endangered species or its critical habitat, BLM would modify, relocate, or abandon the project to obtain a no effect determination.

When no effective alternatives to noxious weed control exist for wilderness study areas (WSAs), BLM's policy is to carry out a management program, but only in small areas. BLM is required to manage WSAs so as not to impair their suitability for preservation as wilderness. Therefore, some actions can occur in WSAs that would not be allowed in wilderness areas. These actions, however, could not im-pair wilderness values at the time the Secretary of the Interior submits his wilderness suitability recommendations to the President (BLM Interim Management Policy and Guidelines for Lands Under Wilderness Review, USDI, BLM 1979).

In wilderness areas, BLM's policy is to allow natural ecological processes to occur and to be interfered with only in rare circumstances. Noxious weeds would not ordinarily be controlled in wilderness areas unless these weeds threaten outside lands or are spreading within the wilderness. In those cases, noxious weeds may be grubbed manually or controlled with herbicides, provided the control can be effected without seriously impairing wilderness values (BLM Wilderness Management Policy—USDI, BLM 1981).

To determine if evidence of historic or prehistoric occupation existed prior to BLM activities, special surveys are undertaken to determine possible conflicts in management objectives. In addition, a Class III (complete) cultural resources inventory is required on all areas to be subjected to ground disturbance. This inventory is conducted in the preplanning stage of an action, and the results are analyzed in an environmental analysis addressing the action (BLM Manual H-1790-1). When a cultural resource that might be harmed is discovered during weed treatment, nearby operations are immediately suspended and may resume only upon receipt of written instructions from the BLM authorized officer. Procedures under 36 CFR 800 would be followed, including consultation with the State Historic Preservation Officer in determining eligibility for nomination to the National Register of Historic Places, effect, and adverse effects.

Preventive management is important in preventing or retarding the spread of noxious weeds. All weed species are spread by seed, vegetative reproduction parts such as rhizomes, tubers, corms, bulbs, and bulblets or both seed and vegetative reproductions parts. The method of spread of noxious weeds that has the greatest impact on all landowners is the continued spread by human activity through the use of vehicles, machinery or cargo equipment along highways, railroads, and rights-of-ways. Noxious weeds also spread downstream from sources of infestation by seed deposit into the water. Animals and birds also spread weeds by ingesting the seed, or having the seed attach to their hair, wool, fur, feathers, etc. and then later the seed dropping to the ground. Label restrictions dealing with buffer zones, feeding areas and holding pastures will be observed. Weeds can also be introduced by hay and other foodstuffs. Weeds have also been introduced in an area because they have been used as an ornamental and escaped from the original site by seed dispersal or vegetative reproduction. Sale of wildflower seeds and wild bird feed in some situations include seeds of such noxious weeds as knapweed or thistle, and should be checked prior to use.

PROPOSED ACTION AND ALTERNATIVES

The treatment methods and acreages included in the proposed action and alternative programs are detailed below. The total annual acreage treated would vary across program alternatives (Table 1-1). Tables 1-2 through 1-6 depict estimated average annual acres to be treated within each state and as proposed under alternative scenarios. The tables were developed in this Final EIS to better describe the origin of treatment acres proposed within the various states. (The five treatment methods—manual, mechanical, biological, prescribed burning, and chemical—are described in the Standard Operating Procedures section.)

The primary difference between the proposed action and Alternative 5, No Action Alternative, is that more treatment methods would be available for use on a greater number of acres in the proposed action than Alternative 5. Some untreated areas may be suitable to treatment by only one method (because of accessibility, cost, feasibility, or amount of surface disturbance acceptable) that is not yet approved for that area. Treatment of these additional acres is reflected in Alternative 1.

The treatment method(s) used in the treatment program selected would depend on characteristics of the soil and the target plant species; the location, size, terrain, and accessibility of the target area; and weather conditions prevalent at the time treatment is necessary.

Chemical or prescribed burning methods will be used to treat the greatest proportion of acres in all five alternatives; manual methods will be used for the smallest proportion of acres (Figure 1-4). Both the manual and mechanical treatment methods are labor intensive, so fewer acres can be treated in any given time period with the same number of workers than with prescribed burning or chemical treatments. In addition, costs of manual and mechanical methods are greater per acre treated than prescribed burning or chemical methods. In most cases, however, manual and mechanical treatment methods can be used under less restrictive weather conditions than chemical or prescribed burning methods.

Alternative 1: Proposed Action

All methods of vegetation treatment—manual, mechanical, biological, prescribed burning, and chemical—would be available to treat vegetation under the proposed action. This is the most flexible of all the alternatives because it would allow implementation of the most effective treatment method on each site.

An estimated average of 372,000 acres would be treated each year; approximately 64 percent of the acres would be treated with chemicals or prescribed burning.

Alternative 2: No Aerial Application of Herbicides

This program alternative also allows all five vegetation treatment methods to be used. However, the application method for chemical treatment would be restricted to ground-based techniques; only vehicle or manual application would be permitted.

The average annual acreage treated would be estimated at 323,000. Prescribed burning and mechanical methods would be used for approximately 63 percent of the acres treated. The elimination of aerial herbicide application would result in 13 percent fewer acres treated than under Alternative 1 because these acres cannot be treated by any other method.

Alternative 3: No Use of Herbicides

Four vegetation treatment methods would be used in this alternative: manual, mechanical, biological, and prescribed burning. Herbicides would not be used under any circumstance.

The estimated average number of acres treated would be 285,000 per year, with prescribed burning and mechanical methods used on approximately 74 percent of the acreage. About 23 percent fewer acres would be treated in this alternative than in Alternative 1 because they cannot be treated by manual, mechanical, biological, or prescribed burning methods.

Alternative 4: No Use of Prescribed Burning

Under this alternative, vegetation treatment would be limited to manual, mechanical, biological, and chemical methods. Prescribed burning would not be used.

The annual estimated acreage treated would average 318,000. Chemical treatments would be used on approximately 55 percent of the acres. About 14 percent fewer acres would be treated with this program alternative than with Alternative 1; these acres may not be effectively treated by any other method.

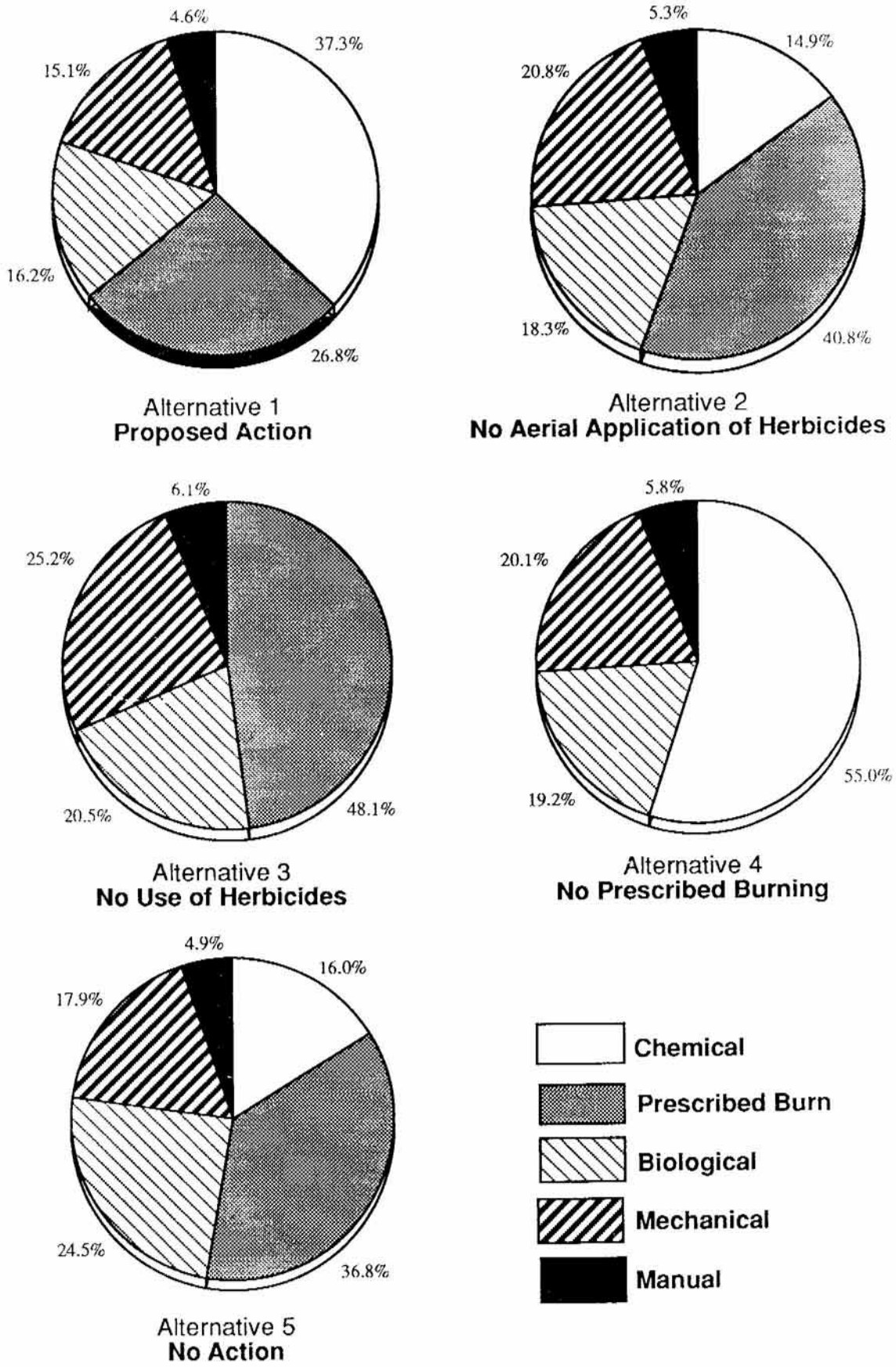


Figure 1-4
Proportion of Acreage Treated Annually by Treatment Method

Alternative 5: No Action (Continue Current Management)

BLM would continue IPM vegetation treatment programs under this alternative. An estimated 243,000 acres would be treated annually using manual, mechanical, biological, prescribed burning, and chemical methods. Approximately 62 percent would continue to be treated using prescribed burning and biological methods.

STANDARD OPERATING PROCEDURES

This section summarizes the available treatment methods and standard operating procedures that would be used in a vegetation treatment program. BLM policies and guidance for public land treatments would be followed in implementing all treatment methods. Many guidelines are provided in Manual Section 1740, Renewable Resource Improvements and Treatments (BLM 1985b); Manual Section 1741, Renewable Resource Improvements, Practices, and Standards (BLM 1985c); Handbook H-1740-1, Renewable Resource Improvement and Treatment Guidelines and Procedures (BLM 1987b); and Manual Section 9220, Integrated Pest Management (BLM 1981a). Appendix J lists many other references for general and specific program policy, procedures, and standards pertinent to implementation of renewable resource improvements.

BLM could use any of the five treatment methods summarized below to suppress undesired vegetation. Operational details of the manual, mechanical, biological, and prescribed burning methods are presented in Appendix C; chemical operations are described in Section 2 of Appendix E.

Vegetation treatment methods are selected based on several important parameters that include (1) the characteristics of the target plant species (size, distribution, density, and life cycle); (2) associated plant species; (3) the land use of the target area; (4) the size, slope, accessibility, and soil characteristics (rockiness and erodibility) of the area to be treated; (5) climatic conditions present at the time of treatment (for example, wind speed, precipitation, or season); (6) the proximity of the area targeted for vegetation treatment to sensitive areas (for example, threatened and endangered plant or animal habitat, riparian zones, significant aquatic resources and unstable watersheds, or areas of human or livestock habitation); (7) need for subsequent revegetation, and (8) time of year treatment could occur. Site-specific analyses consider all these factors before a treatment method is selected.

Reseeding is sometimes required after treatment when remaining vegetation is present in insufficient quantity to naturally reseed the site. Site-selection factors important for successful seeding, which are part of the decision process for the whole treatment, include adequate soil for root development and moisture storage, adequate moisture to support the species seeded, and minimal rockiness and slope. Chances for seeding success are also improved by selecting seed with high purity and percentage germination, planting at proper depth, planting at the right time of year for the region, selecting an appropriate seeding rate for the method of seeding, and determining whether broadcast seeding will be adequate or whether drilling will be required.

All values and uses of a site dictate selection of a seed mixture. Some of these considerations include maintaining vegetative diversity for rangeland and wildlife uses, improving recreation and aesthetic values, and improvement of watershed values. The most satisfactory mixtures for most rangeland situations include a combination of adapted grasses, forbs, and shrubs. Forbs and shrubs in particular can enhance the value of a treated site for wildlife, and excellent forb and shrub varieties and ecotypes adapted to many rangeland situations are available. Mixtures can better take advantage of variable soil, terrain, and climatic conditions and are more likely to withstand insect infestations and survive adverse climatic conditions. Once the site has been seeded, it is important to allow seeded vegetation to establish. On most rangeland seeding, this usually means no grazing for two full growing seasons following seeding, and longer if dry conditions prevail during the establishment period.

During site specific analysis and preliminary planning of weed management programs, some of the considerations taken will be:

A. Management program/objective for the site.

B. Total acres in the unit.

C. Number of acres infested with weed in the unit.

D. Predominant weed species in the unit.

E. Predominant non-target plant species in the unit.

F. Consideration of all feasible pest management alternatives, including:

   (1) Identification of environmental effects on fish, wildlife, soil, ground and surface water, air, rare/endangered plants and animals, nontarget plants and culture sites.

   (2) Human health hazard(s) associated with each method.

   (3) Effectiveness of each method (retreatment needs).

(4) Cost of each method.

(5) Cost of each method regarding hazards to nontarget species.

(6) Map of survey unit(s).

(7) Growth characteristics, sensitivity to treatment method, stage of growth, life span, etc. of both target and nontarget plant species at the time of treatment.

G. Recommended treatment method(s), or combination of methods.

H. If chemical pesticides are recommended, the following additional information is required:

(1) Pesticide common names, application rate, carrier.

(2) Posting requirements (if needed).

(3) Positive placement techniques planned to minimize drift and effects on nontarget areas.

(4) Method of application (ground, aerial, backpack).

(5) Special restrictions on the pesticide label or BLM regulations with regard to handling, buffer strips, grazing, re-entry, wind, droplet size, etc.

(6) Monitoring plans (water, efficacy, nontarget effects, target effects, etc.)

Generally, mechanical treatment would avoid areas of high slope (greater than 20 to 30 percent); areas of high erosion hazard where vegetation cover is adequate; areas where revegetation potential is low; areas frequently impacted by high precipitation events; and areas having high potential for compaction. Buffer strips would be left around water courses and drainages. Soil disturbing activities would be perpendicular to the slope, where possible, to reduce concentrating the water.

Usually, biological methods using ungulates would avoid erosion hazard areas, areas of compactible soils, riparian areas susceptible to bank damage, and steep erodible slopes.

Treatment Method Descriptions

Manual

Hand-operated power tools and hand tools are used in manual vegetation treatment to cut, clear, or prune herbaceous and woody species. Under the proposed action, approximately 4 percent of the treatment areas (14,000 acres) would be treated in this manner. In manual treatments, workers would cut plants above ground level; pull, grub, or dig out plant root systems to prevent subsequent sprouting and regrowth; scalp at ground level or remove competing plants around desired vegetation; or place mulch around desired vegetation to limit the growth of competing vegetation.

Hand tools such as the hand saw, axe, shovel, rake, machete, grubbing hoe, mattock (combination of axe and grubbing hoe), brush hook, and hand clippers are used in manual treatments. Axes, shovels, grubbing hoes, and mattocks can dig up and cut below the surface to remove the main root of plants such as prickly pear and mesquite that have roots that can quickly resprout in response to surface cutting or clearing. Workers also may use power tools such as chain saws and power brush saws.

Although the manual method of vegetation treatment is labor intensive and costly, compared to prescribed burning or herbicide application, it can be extremely species selective and can be used in areas of sensitive habitats or areas that are inaccessible to ground vehicles.

Mechanical

BLM uses wheel tractors, crawler-type tractors, or specially designed vehicles with attached implements for mechanical vegetation treatments (Figure 1-5). About 16 percent (58,000 acres) of the proposed vegetation treatments would use mechanical methods. The best mechanical method for treating undesired plants in a particular location depends on the following factors: (1) characteristics of the undesired species present (for example, density, stem size, brittleness, and sprouting ability); (2) need for seedbed preparation and revegetation; (3) topography and terrain; (4) soil characteristics (for example, type, depth, amount and size of rocks, erosiveness, and susceptibility to compaction); (5) climatic conditions; and (6) potential cost of improvement as compared to expected productivity.

Biological

Biological methods of vegetation treatment employ living organisms to selectively suppress, inhibit, or control herbaceous and woody vegetation (Figure 1-6). This method is viewed as one of the more natural processes because it requires the proper management of plant-eating organisms and precludes the use of mechanical devices, chemical treatments, or burning of undesired vegetation. Approximately 16 percent (60,000 acres) of BLM's proposed vegetation treatment program would use biological methods.

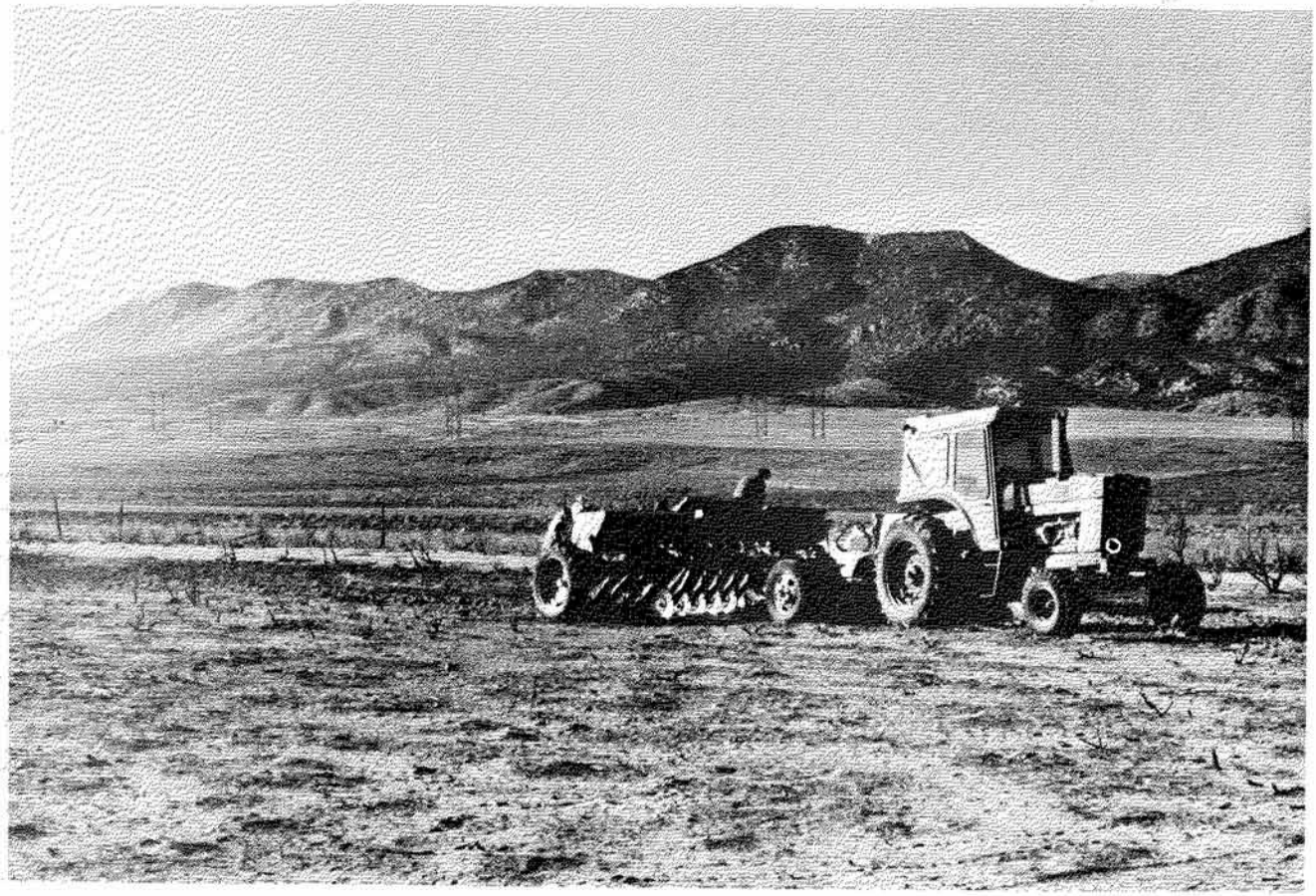


Figure 1-5. Mechanical disking equipment.

The use of biological control agents will be conducted in accordance with BLM procedures in the Use of Biological Control Agents of Pests on Public Lands (BLM 1990). Insects, pathogens, and grazing by cattle, sheep or goats would be used as biological control methods under all alternatives, although at the present these methods can control few plant species. Insects are the main natural enemies being used at the present time. Other natural enemies include mites, nematodes and pathogens. This treatment method will not eradicate the target plant species but merely reduces the target plant densities to more tolerable levels. This method also reduces competition with the desired plant species for space, water and nutrients. This treatment method will be used on larger sites where the target plant has become established and is strongly competitive.

Generally, biological methods using cattle, sheep, or goats would avoid erosion hazard areas, areas of compactible soils, riparian areas susceptible to bank damage, and steep erodible slopes.

Biological control using cattle, sheep or goats would be applied to treatment areas for short periods. When considering the use of grazing animals as an effective biological control measure, several factors will be taken into consideration including:

(1) target plant species present,

(2) size of the infestation of target plant species,

(3) other plant species present,

(4) stage of growth of both target and other plant species,

(5) palatability of all plant species present,

(6) selectivity of all plant species present by the grazing animal species that is being considered for use as a biological control agent,

(7) the availability of that grazing animal within the treatment site area, and

(8) type of management program that is logical and realistic for the specific treatment site.

These factors will be some of the options taken when developing the individual treatment for a specific site.

Although discussed as biological agents, cattle, sheep and goats are not truly biological agents but are domestic animals used to control only the top-growth of certain noxious weeds. The following are some advantages of using domestic animals, mainly sheep or goats, for noxious weed control: (1) they use weeds as a food source, (2) following a brief adjustment period, they sometimes consume as much as 50 percent of their daily diet of this species, (3) average daily gains of offspring grazing certain weed-infested pastures can sometimes be significantly higher than average daily gains of offspring grazing grass pastures, and (4) sheep or goats can be used in combination with herbicides.

Some of the disadvantages of using domestic animals are (1) they also use nontarget plants as food sources, (2) the use of domestic animals, like sheep or goats, requires a herder or temporary fencing, (3) the animals may be killed by predators such as coyotes, (4) heavy grazing of some weed species, such as leafy spurge, tends to loosen the stool of the grazing animals, and (5) most weed species are less palatable than desirable vegetation and would cause overgrazing.

Particular insects, pathogens or combinations of these biological control agents may also be introduced into an area of competing or undesired vegetation to selectively feed upon or infect those target plants and eventually reduce their density within that area. Only on rare occasions will one specific biological control agent reduce the target plant density to the desired level of control. Therefore in most situations, a complex of biological control agents is needed to reduce the target plant density to a desirable level. But even with a complex of biological control agents, often 15 to 20 years are needed to bring about an economic control level, especially on creeping perennials. In most circumstances, biological control agents are not performing control. They are only creating stresses on the weeds, which is not the same as control.

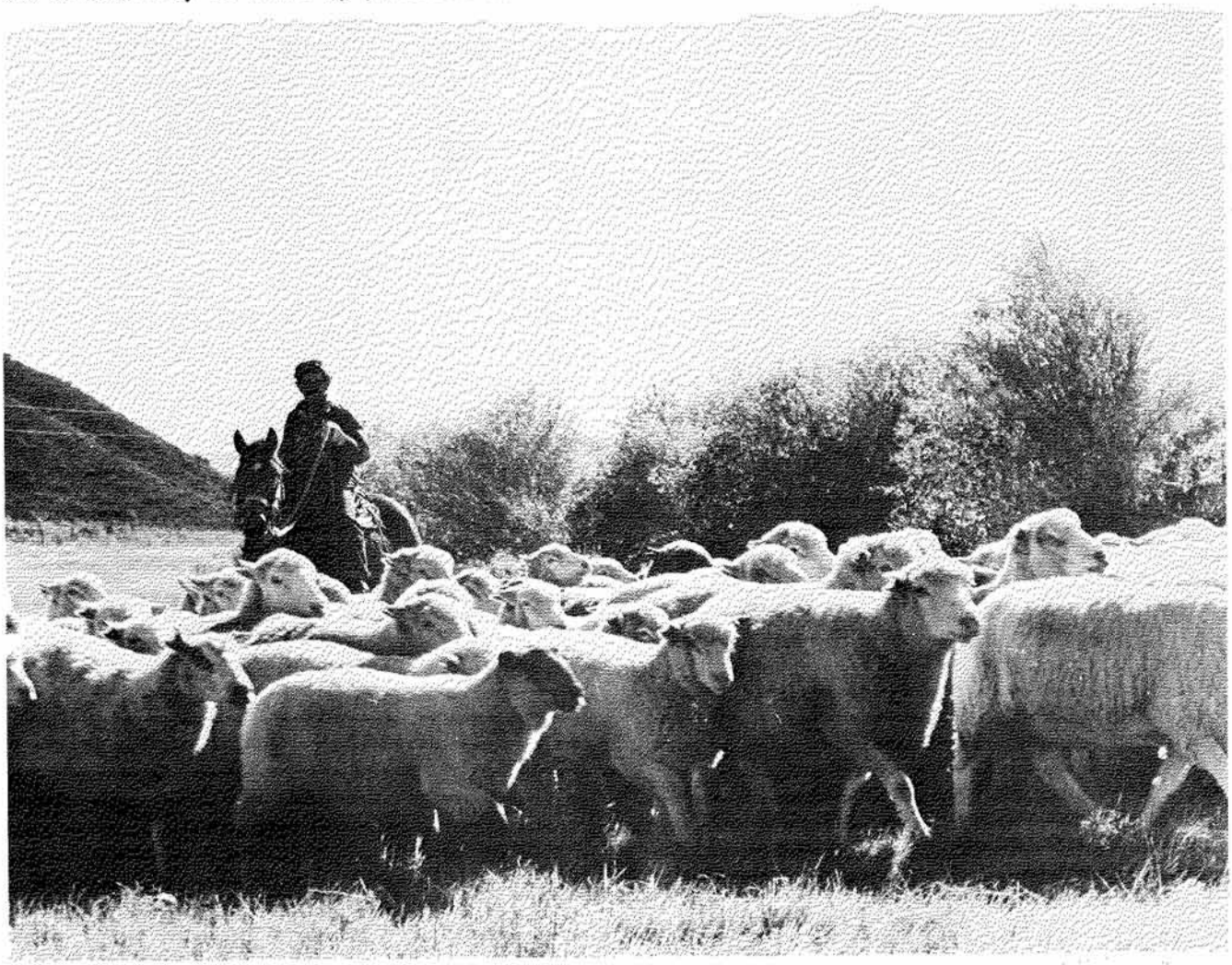


Figure 1-6. Grazing biological treatment using sheep.

As biological control agents become available, BLM will continue to increase their use. See Appendixes C2, C3 & C4 for the lists of biological control agents that are currently being considered for use.

Some of the advantages of using natural enemies to control weeds are that (1) they are self-perpetuating, (2) they can be comparatively economical once studied and established, (3) they can be highly selective, (4) they offer a high degree of environmental safety, and (5) they do not require fossil fuel energy.

Biological control, however, does have limitations because (1) it is a slow process, (2) it does not achieve eradication but merely reduces weed densities to more tolerable levels, (3) it is highly selective, attacking one weed existing among a complex of other weeds, (4) it cannot be used against weeds that are valued under some situation because insects or pathogens do not recognize boundaries, (5) it cannot be used against weeds that are closely related to beneficial plants because the insects or pathogens may be unable to discriminate between related plant species, and (6) it cannot be used against weeds when the biological control agent requires an alternate host that may be a beneficial plant.

To develop a biological weed control program, the following steps must be taken:

(1) Identify weed species and determine origin.

(2) Determine if any natural enemies occur at the point of origin.

(3) If possible, collect natural enemies.

(4) Hold preliminary screening trials on the natural enemies of the weed in the United States.

(5) Hold further screening trials in the United States.

(6) Raise biological control agents before first release.

(7) Release biological control agents for the first time onto selected sites.

(8) If biological control agents survive and increase in numbers, collect agents and release onto other sites of weed infestation.

Usually a complex of at least three to five different biological agents, such as insects, must be used to attack an individual weed infestation site. But even with a complex of biological agents, often 15 to 20 years are needed to bring about an economic control level, especially on creeping perennials.

Prescribed Burning

Prescribed burning is the planned application of fire to wildland fuels in their natural or modified state, under specified conditions of fuels, weather, and other variables, to allow the fire to remain in a predetermined area and to achieve site-specific fire and resource management objectives (Figure 1-7).

Management objectives of prescribed burning include the control of certain species; enhancement of growth, reproduction, or vigor of certain species; management of fuel loads; and maintenance of vegetation community types that best meet multiple-use management objectives. Treatments would be implemented in accordance with BLM procedures in Fire Planning (BLM 1987c), Prescribed Fire Management (BLM 1988b), and Fire Training and Qualifications (BLM 1987d).

Chemical

Treatments would be conducted in accordance with BLM procedures in Chemical Pest Control (BLM 1988c). Treatments would meet or exceed individual States' label standards. The chemicals can be applied by many different methods, and the selected

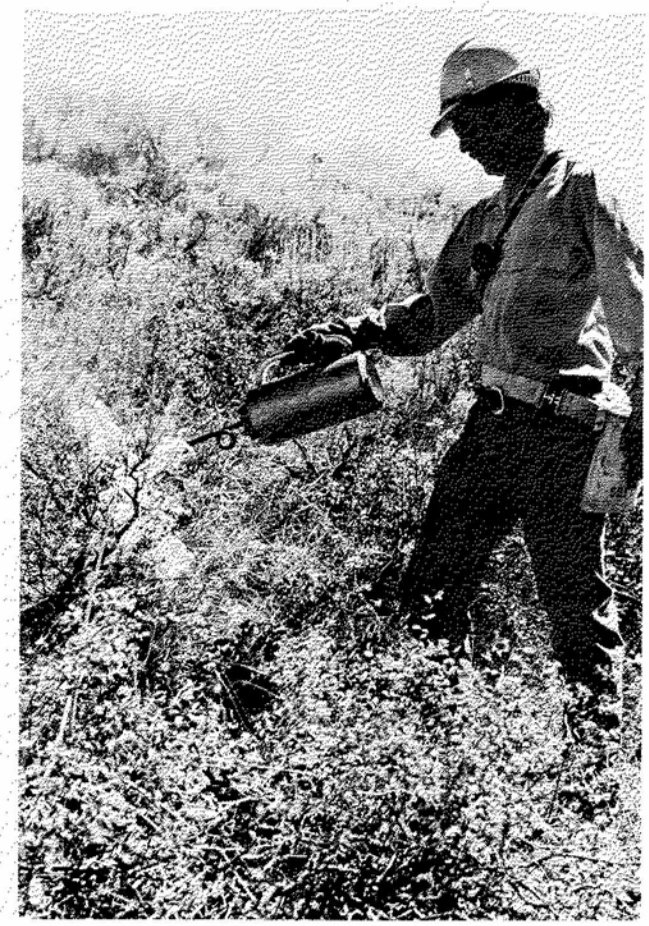


Figure 1-7. Drip torch used to ignite a prescribed burn.

technique depends on a number of variables. Some of these are (1) the treatment objective (removal or reduction); (2) the accessibility, topography, and size of the treatment area; (3) the characteristics of the target species and the desired vegetation; (4) the location of sensitive areas in the immediate vicinity (potential environmental impacts); (5) the anticipated costs and equipment limitations; and (6) the meteorological and vegetative conditions of the treatment area at the time of treatment.

Herbicide applications are scheduled and designed to minimize potential impacts on nontarget plants and animals, while remaining consistent with the objective of the vegetation treatment program. The rates of application depend on the target species, presence and condition of nontarget vegetation, soil type, depth to the water table, presence of other water sources, and the requirements of the label.

In many circumstances the herbicide chosen, time of treatment, and rate of application of the herbicide is different than the most ideal herbicide application for maximum control of the target plant species in order to minimize damage to the nontarget plant species, and to ensure minimum risk to human health and safety.

The chemicals would be applied aerially with helicopters (Figure 1-8) or fixed-wing aircraft or on the ground using vehicles or manual application devices. Helicopters are more expensive to use than fixed-wing aircraft, but they are more maneuverable and effective in areas with irregular terrain and in treating specific target vegetation in areas with many vegetation types. Manual applications are used only for treating small areas or those inaccessible by vehicle.

Nineteen herbicides were proposed for use in the vegetation treatment program. However, after impact and risk assessment analyses, 17 are proposed for use in the vegetation treatment program. BLM has reexamined the risk assessment and examined additional data for amitrole. BLM has determined that amitrole is no longer considered for proposed use in this document. Amitrole will be deleted in the Record of Decision. Since drafting this document, producers are no longer manufacturing dalapon formulations registered for proposed use. Therefore, dalapon is no longer considered for use. However, information on all 19 herbicides is included throughout the document.

Figure 1-8. Helicopter herbicide application.

The typical and maximum application rates of each would vary, depending on the program area being treated (Tables 1-7 and 1-8). Toxicity and environmental fate summaries for each herbicide are provided below. (References for these discussions are given in Appendix E.)

Toxicity and Environmental Fate Summaries

Amitrole. Amitrole is a broad-spectrum herbicide used for controlling a wide range of grasses and broadleaf weeds. It is registered for use on many non-crop sites, including rights-of-way, marshes and drainage ditches, ornamentals, and commercial, industrial, agricultural, and domestic properties. Amitrole is readily absorbed and translocated by roots and leaves and prevents normal plant growth by disrupting chloroplast development, bud regrowth, and the metabolism of nucleic acid precursors.

A crystalline, colorless, and odorless compound, amitrole is soluble in some polar solvents and stable in heat to 100° C (212° F). Amitrol T™, a commonly used formulation manufactured and marketed by the Rhone-Poulenc Company, contains 21.5 percent (2 lbs/gal) amitrole and 78.4 percent inert ingredients.

Evidence suggests that amitrole produces slight to very slight acute effects in mammals. The thyroid and pituitary glands seem to be the primary target organs in rat feeding studies. Rat feeding studies also have demonstrated consistently an oncogenic potential, and consequently EPA has classified amitrole as a probable carcinogen. In the herbicide risk assessment conducted for this final EIS, amitrole was assumed to be carcinogenic. However, no mutagenic or teratogenic effects have been noted in laboratory studies. Amitrole is only slightly toxic to fish and crayfish, very slightly toxic to birds, and moderately toxic to aquatic invertebrates.

Table 1-7

Typical Herbicide Application Rates by Area (pounds active ingredient per acre)

Herbicide	Trade Name(s)[1]	Rangeland	Public Domain Forest Land	Oil and Gas Sites[2]	Rights-of-Way on Public Land	Recreation Sites[3]
Amitrole	Amitrol-T	2	2	4	2	—
Atrazine	AAtrex, Atratol	1	4	10	4	1
Bromacil	Hyvar X	—	—	8	8	—
Bromacil + Diuron	Krovar 1	—	—	8	8	—
Chlorsulfuron	Telar	—	2 oz	2.25 oz	2.25 oz	2 oz
Clopyralid	Reclaim, Stinger	0.5	—	—	12	12
2,4-D	Clean Crop, DMA4, Esteron 99, Weedar, Weedone	4	4	4	4	3
Dalapon	Dalapon 85	3	4	4	4	4
Dicamba	Banvel	4	4	8	4	4
Diuron	Karmex	—	—	10	4	—
Glyphosate	Rodeo, Roundup, Accord	4	2	4	4	4
Hexazinone	Velpar	0.67	2	4	2	2
Imazapyr	Arsenal	1	1.5	1.5	1.5	1.5
Mefluidide	Embark	—	—	0.25	0.25	—
Metsulfuron Methyl	Escort	—	—	1.2 oz	1.2 oz	—
Picloram	Grazon PC Tordon	2	2	3	3	2
Simazine	Princep 80W, Princep 4G, Aquazine, Simazine 80W	—	4	10	4	1
Sulfometuron Methyl	Oust	—	—	9 oz	9 oz	—
Tebuthiuron	Graslan, Spike	0.5	1.5	6	1.5	0.5
Triclopyr	Garlon, Grazon ET	1.5	2	4	4	1.5

[1] For a complete listing of formulations available for use, see Appendix M. These formulations have been investigated to insure that they contain no inerts on Lists 1 or 2 of the Environmental Protection Agency (EPA) lists of inerts.

[2] Includes oil and gas drilling and production facilities, pipelines, powerlines, and roads on public land.

[3] Includes developed recreation sites, Recreation and Public Purpose (R&PP) sites, and cultural and historical sites on public land.

Table 1-8

Maximum Herbicide Application Rates by Area (pounds active ingredient per acre)

Herbicide	Trade Name(s)[1]	Rangeland	Public Domain Forest Land	Oil and Gas Sites[2]	Rights-of-Way on Public Land	Recreation Sites[3]
Amitrole	Amitrol-T	2	2	9.9	9.9	—
Atrazine	AAtrex, Atratol	1	4	40	40	1
Bromacil	Hyvar X	—	—	16	16	—
Bromacil + Diuron	Krovar 1	—	—	20	20	—
Chlorsulfuron	Telar	—	2 oz	2.25 oz	2.25 oz	2 oz
Clopyralid	Reclaim, Stinger	0.5	—	—	12	12
2,4-D	Clean Crop, DMA4, Esteron 99, Weedar, Weedone	6	8	4	4	3
Dalapon	Dalapon 85	3	4	22	22	4
Dicamba	Banvel	8	4	8	8	8
Diuron	Karmex	—	—	32	32	—
Glyphosate	Rodeo, Roundup, Accord	5	3	4	4	5
Hexazinone	Velpar	0.67	3	10.8	10.8	3
Imazapyr	Arsenal	1	1.5	1.5	1.5	1.5
Mefluidide	Embark	—	—	0.25	0.25	—
Metsulfuron Methyl	Escort	—	—	1.2 oz	1.2 oz	—
Picloram	Grazon PC Tordon	2	2	3	3	2
Simazine	Princep 80W, Princep 4G, Aquazine, Simazine 80W	—	4	10	10	4
Sulfometuron Methyl	Oust	—	—	9 oz	9 oz	—
Tebuthiuron	Graslan, Spike	4	5	6	6	4
Triclopyr	Garlon, Grazon ET	1.5	4	8	8	1.5

[1] For a complete listing of formulations available for use, see Appendix M. These formulations have been investigated to insure that they contain no inerts on Lists 1 or 2 of the Environmental Protection Agency (EPA) lists of inerts.

[2] Includes oil and gas drilling and production facilities, pipelines, powerlines, and roads on public land.

[3] Includes developed recreation sites, Recreation and Public Purpose (R&PP) sites, and cultural and historical sites on public land.

Microbiological breakdown is approximately 2 to 3 weeks in moist, warm soil. This breakdown period would be greater under drier conditions. Loss due to photolysis and volatilization is minor. Adsorption is considered strong but reversible. Mobility is considered moderate with a solubility in water of 280,000 ppm. The persistence is considered short to moderate with a half-life less than 1 to 6 months.

Atrazine. Atrazine is a selective triazine controlling herbicide used for broadleaf and grassy weeds. It is registered for use with a variety of grains and fruits, rangeland, turf grass sod, conifer reforestation, Christmas tree plantations, grass in orchards, proso millet, ryegrass (perennial), grass seed fields, nonselective vegetation control in chemical fallow, and noncrop lands. Atrazine is absorbed through roots and foliage and acts as a photosynthetic inhibitor.

Pure atrazine is a white, crystalline solid. The two brands of atrazine proposed for use on BLM lands, AAtrex™ and Atratol™, are manufactured by the Ciba-Geigy Corporation.

Atrazine is slightly toxic to mammals for acute oral exposure and dermal effects but is moderately toxic as an eye irritant. Effects to the kidneys have been observed in rats, including increased ion elimination, decreased creatinine clearance, increased urine protein levels, and increased lactate dehydrogenase activity. Based on chronic feeding/oncogenicity studies, EPA has classified atrazine as a possible human carcinogen. Consequently, atrazine was assumed to be a carcinogen in the herbicide risk assessment conducted for this final EIS. Although all EPA-validated mutagenicity assays are negative, studies in the open literature suggest that atrazine is a possible human germ cell mutagen. Atrazine is moderately to highly toxic to fish and aquatic invertebrates and is highly toxic and teratogenic to immature fish and amphibians. It is of low toxicity to birds.

Microbiological breakdown possibly accounts for a significant portion of atrazine decomposition in soil. Adsorption on soil particles readily occurs but is not strong. Atrazine normally is not found below the upper foot of soil in detectable quantities. Pho-

tolysis and volatilization occur to some extent if high temperatures and prolonged sunlight follow application before precipitation. Mobility is considered moderate with a solubility in water of 33 ppm. Soil half-life persistence is 18 to 120 days. See Table 3-6.

Bromacil. Bromacil is used on noncropland areas to control a wide range of annual and perennial grasses and broadleaf weeds and certain woody species. The herbicide also is used for the selective control of annual and perennial weeds in citrus fruit orchards and for seedling weeds in pineapple orchards. A combination of bromacil and diuron is used in citrus and noncropland areas. Bromacil is readily absorbed through root systems and is a potent inhibitor of photosynthesis.

Pure bromacil is a white, odorless, crystalline solid that is stable in water, aqueous bases, and common organic solvents. E.I. du Pont de Nemours & Company manufactures the two formulations proposed for use on BLM lands, Hyvar™X and Krovar™1. Hyvar™X contains 80 percent bromacil and 20 percent inert ingredients, while Krovar™1 contains a mixture of bromacil (40 percent) and diuron (40 percent) and 20 percent inert ingredients.

Bromacil is slightly toxic to mammals during acute exposure, a mild eye irritant, and a very slight skin irritant. In a chronic toxicity study with rats, lowered growth rates, decreased erythrocyte counts, increased thyroid activity, and the enlargement of centrolobular cells of the liver have been observed. Given the occurrence of carcinomas and hepatocellular adenomas in a chronic mouse feeding/oncogenicity study, EPA has classified bromacil as a possible human carcinogen. Accordingly, bromacil was assumed to be a carcinogen in the herbicide risk assessment conducted for this final EIS. Bromacil has no demonstrated teratogenic or fetotoxic effects and is considered nonmutagenic by EPA. However, it is slightly toxic to birds and aquatic organisms.

Microbiological breakdown is considered a mode of breakdown. Its adsorption on soils is considered low. Mobility is high as with its solubility in water of 132,000 ppm. Soil half-life persistence of bromacil acid is 60 to 360 days, and bromoxynil octanoate ester is 1 to 14 days. See Table 3-6.

Chlorsulfuron. Chlorsulfuron is an herbicide used for controlling many common broadleaf weeds and certain grassy weeds in the cereal crops of wheat, barley, and oats; it also may be used in the fallow period before planting. Chlorsulfuron is absorbed rapidly by foliage and causes inhibition of cell division.

Pure chlorsulfuron is an odorless, white, crystalline solid that is stable under normal use conditions. The formulation proposed for use by BLM is made by Du Pont and is marketed under the name Telar™. This formulation is 75 percent active ingredient by weight.

Based on studies with rats and rabbits, chlorsulfuron is considered to be very slightly toxic to mammals during acute oral and dermal exposures. Also, available data indicate that chlorsulfuron is noncarcinogenic and nonmutagenic. Chlorsulfuron is practically nontoxic to fish and is of low toxicity to birds.

Metabolism through normal soil microbial processes occur. Hydrolysis is an important degradation mechanism while photolysis and volatization play minor roles. Adsorption to clay is low. Its solubility is high in water of neutral pH and several magnitudes lower in low pH water. Low pH water accelerates hydrolysis. Soil half-life persistence is 28 to 160 days. See Table 3-6.

Clopyralid. Clopyralid is a systemic, postemergent herbicide that is effective against many species of Compositae, Fabaceae, Solanaceae, and Apiaceae. It is selective in graminaceous crops, as well as broad-leaved crops, such as brassicas, sugar beets, flax, strawberries, and onion-type crops. It may also be applied to cereal crops in combination with other herbicides. It has auxin-like activity, inducing severe epinasty and hypertropy of the crown and leaves.

Pure clopyralid forms colorless crystals. Its melting point is approximately 151° C (304° F). It is soluble in water and is acidic. Clopyralid forms salts, which in solution are corrosive to aluminum, steel, and tinplate. The brands proposed for use on BLM lands, Reclaim™ and Stinger™, are manufactured by the Dow Chemical Company.

Clopyralid is classified as slightly to very slightly toxic to mammals. It is a severe eye irritant, however. Oncogenicity and mutagenicity studies suggest that clopyralid is noncarcinogenic and nonmutagenic. Clopyralid has a low order of toxicity for fish and aquatic invertebrates and is nontoxic to bees.

Microbial decomposition appears to occur. Photolysis is not important in decomposition. Does not appear to be strongly sorbed on soil and may be subject to leaching. Solubility is high. Persistence is low with the half-life being in the range of 12 to 70 days for clopyralid amine salt. See Table 3-6.

2,4-D. 2,4-D is a systemic herbicide widely used to control broadleaf weeds in wheat, field corn, grain sorghum, sugar cane, rice, barley, and rangeland and pastureland. 2,4-D is absorbed by plant roots

and leaves and causes abnormal growth response and affects respiration, food reserves, and cell division.

Pure 2,4-D forms white, odorless crystals, with a melting point of 140° C (284° F). Some formulations proposed for use by BLM include Clean Crop™ (Platte Chemical Company), DMA4™ (Dow Chemical), Esteron 99™ (Dow Chemical), Weedar™ (Rhone-Poulenc), and Weedone™ (Rhone-Poulenc).

Acute oral toxicity studies indicate that 2,4-D is moderately toxic to mammals. It is a severe eye irritant. Ingestion or skin exposure to 2,4-D by humans may produce many different symptoms, including irritation to the gastrointestinal tract, chest pain, and muscle twitching. Ingestion of large doses of the herbicide may cause gastroenteritis, skeletal and cardiac myotonia, and central nervous system depression. However, there is little conclusive evidence of 2,4-D carcinogenicity, and the results of many oncogenicity studies are disputed. Because of this uncertainty, 2,4-D was assumed to be carcinogenic in the herbicide risk assessment conducted for this final EIS. Although mutagenicity findings are similarly inconclusive, 2,4-D cannot be ruled out as a weak mutagen. 2,4-D is moderately to highly toxic for aquatic species, with amphipods and snails among the most sensitive groups. In addition, 2,4-D is moderately toxic to some species of birds.

2,4-D has a moderate mobility with a high solubility in its acid form. Its adsorption to soil is not strong. Soil half-life persistence of 2,4-D acid is 2 to 16 days, and of 2,4-D esters is 2 to 41 days. See Table 3-6.

Dalapon. Dalapon is used to control annual and perennial grasses. Registered uses include noncropland areas, such as railroads, conifer planting sites, fence rows, and ditch banks. Dalapon also may be used for the preplanting of crops such as sugar beets, beans, corn, and potatoes and on existing crops, such as asparagus, citrus, field corn, cotton, flax, potatoes, apples, pears, apricots, peaches, plums, and grapes. Dalapon is readily absorbed by roots and leaves and interferes with meristematic activity in root tips and apical meristems.

Dalapon sodium salt is a nonflammable, hygroscopic, white-to-tan colored powder, with a melting point of 193° to 197° C (379° to 387° F). Dalapon 85™, a formulation manufactured by the Fermenta ASC Corporation, is proposed for use on BLM lands.

Dalapon is classified as very slightly toxic to mammals during acute oral exposure. It also is slightly toxic as a skin and eye irritant. No teratogenic or reproductive effects have been observed in rats, but data gaps currently exist in these areas. Also, no carcinogenic effects have been observed in laboratory studies, and EPA has determined that dalapon is not classifiable in its human carcinogenicity criteria because of insufficient study data. Available data indicate that dalapon is nonmutagenic. Dalapon is slightly toxic to birds and fish and is relatively nontoxic to honey bees. The toxicity of the herbicide to aquatic invertebrates, however, is quite variable; some species are sensitive to dalapon exposure, while others are fairly tolerant.

Dalapon breaks down completely in soils through microbial processes. It has no adsorption on soils. The solubility is high, and its mobility is considered moderate. Its persistence is short, less than 1 month.

Dicamba. Dicamba is an herbicide used in postemergent weed control in field corn, wheat, oats, barley, sorghum, pastureland and rangeland, turfgrass, and industrial brush control and noncrop areas, such as fence rows, roadways, and wastelands. Dicamba is readily absorbed by leaves and roots and is concentrated in the metabolically active parts of plants. Toxic effects of dicamba are related to its growth-regulating properties and are similar to those of 2,4-D.

Pure dicamba is a white, crystalline, odorless solid. The melting point of dicamba is between 114° to 116° C (237° to 241° F). Banvel™, the formulation proposed for use on BLM lands, is manufactured by Sandoz Crop Protection Corporation and contains 49 percent active ingredient.

Based on acute oral exposures, dicamba is classified as slightly toxic to mammals. Also, it is a very slight skin irritant. However, dicamba is classified as a severe eye irritant. No teratogenic or reproductive effects have been noted for dicamba. Also, oncogenicity studies with dicamba have not demonstrated any carcinogenic potential, and the herbicide is currently not classifiable in EPA's human carcinogenicity criteria. Mutagenicity tests suggest that dicamba is nonmutagenic. For wildlife, technical dicamba and various formulations are considered to be slightly toxic to birds and most aquatic species but are moderately toxic to insects.

Microbiological breakdown is a major mode of decomposition. There is some information showing it degrades from photodecomposition. Its mobility is high as is its solubility. Soil half-life persistence of dicamba salt is 3 to 35 days. See Table 3-6. Studies have shown that dicamba can be leached out in humid areas in less than 3 months.

Diuron. Diuron is a substituted urea compound registered for use as an herbicide to control a wide variety of annual and perennial broadleaf and grassy weeds. Diuron is registered for use on forage crops, field crops, fruits, vegetables, nuts, and ornamental crops. In noncrop applications, diuron is used on

industrial sites, rights-of-way, and irrigation and drainage ditches. Diuron is readily absorbed by the root system and is a strong inhibitor of the Hill reaction.

A white, crystalline solid, diuron melts at 180° to 190° C (356° to 374° F). Karmex™, manufactured by Du Pont, is the formulation proposed for use by BLM and contains 80 percent diuron. Acute oral toxicity studies indicate that diuron is slightly toxic to mammals. With sufficient exposure, however, diuron facilitates nervous system depression, and the resulting symptoms include slowed respiration and heart rate, weakness, and lethargy. Diuron is only very slightly toxic to mammals through skin and eye exposure. No reproductive or teratogenic effects have been observed, and, given the lack of clear evidence of carcinogenicity, diuron is presently not classifiable as a human carcinogen. However, EPA has determined that additional teratology, mutagenicity, and carcinogenicity studies must be submitted in support of diuron's registration. Diuron is very slightly toxic to birds, moderately toxic to fish, and highly toxic to certain aquatic invertebrate species.

Microbial processes are important in its breakdown. Photolysis and volatization are not important. Its adsorption to clay and organic matter is high. Its mobility is moderate and has a solubility of 42 ppm. Soil half-life persistence is 30 to 328 days. See Table 3-6.

Glyphosate. Glyphosate is a very broad-spectrum herbicide that is relatively nonselective and is very effective on deep-rooted perennial species and annual and biennial species of grasses, sedges, and broadleaf weeds. Glyphosate is absorbed by the foliage and translocated throughout the plant. The herbicide appears to inhibit the aromatic amino acid biosynthesis pathway and is a strong inhibitor of sprouting by perennial species.

Glyphosate is a white, odorless solid that melts at 200° C (392° F). The Rodeo™, Roundup™, and Accord™ formulations of glyphosate, manufactured by Monsanto, are proposed for use by BLM.

Technical glyphosate and its two primary formulations, Roundup™ and Rodeo™, are classified as slightly toxic to mammals. Also, no reproductive or teratogenic effects have been noticed in laboratory animals exposed to glyphosate. Because of the inadequacy of current oncogenicity studies, the carcinogenic potential of glyphosate has not been determined by EPA. However, glyphosate was assumed to be carcinogenic in the herbicide risk assessment conducted for this final EIS. Available data suggest that glyphosate is nonmutagenic. For wildlife, glyphosate is considered slightly toxic to birds and relatively nontoxic to honey bees. Also, technical glyphosate and the Rodeo™ formulation are slightly to practically nontoxic to fish and aquatic invertebrates. The surfactants in Roundup™, however, render this formulation far more toxic to aquatic organisms than the other formulations. Roundup™ is instead slightly to moderately toxic to fish and aquatic invertebrates.

Microbial processes are important in its breakdown. Photolysis and volatization are not important. Its adsorption to soils is strong. It has a low to moderate mobility and a high solubility. Soil half-life persistence of glyphosate amine salt is 21 to 60 days. See Table 3-6.

Hexazinone. Hexazinone is used for contact and residual control of many annual, biennial, and perennial weeds, woody vines, and brush. Registered uses include fruit, sugar cane, alfalfa, pastureland and rangeland, rights-of-way, Christmas tree plantations, and conifer forest plantings. Hexazinone is readily absorbed through foliage and roots and acts as a photosynthesis inhibitor.

Hexazinone is a white, crystalline solid, soluble in water, with a melting point of 115° to 117° C (239°

Spotted Knapweed

to 243° F). Velpar™, a commonly used formulation manufactured by Du Pont, contains 90 percent hexazinone and 10 percent inert ingredients.

Hexazinone is slightly toxic to mammals based on acute oral exposure in rats. Acute toxicity effects include pallor, salivation, nose bleeds, dyspnea, lethargy, tremors, and convulsions. These effects were only observed at lethal or near-lethal doses. Although hexazinone is a very slight skin irritant, it is classified as a severe eye irritant. No teratogenic or reproductive effects have been observed for hexazinone. Available evidence also indicates that hexazinone is noncarcinogenic and nonmutagenic. The herbicide is practically nontoxic to birds and fish and is relatively nontoxic to insects. Hexazinone is slightly toxic to aquatic invertebrates, however.

Microbial decomposition appears to occur. Photolysis occurs, volatization is negligible. Adsorption to soil is low. Mobility is high as its solubility in water. Soil half-life persistence is 30 to 180 days. See Table 3-6.

Imazapyr. Imazapyr is a broad-spectrum, nonselective herbicide used to control annual and perennial herbaceous plants, deciduous trees, vines, and brambles in noncropland situations. Registered uses include railroad, utility and pipeline rights-of-way, petroleum tank farms, utility plant sites, and fence rows. Imazapyr is readily absorbed by roots and foliage of plants and inhibits plant growth by affecting the biosynthetic pathway of aliphatic amino acids.

Pure imazapyr is a white-to-tan powder, with a slight acetic acid odor. Its melting point is 169° to 173° C (336° to 343° F) and is only slightly soluble in water. The formulation proposed for use on BLM lands, Arsenal™, is manufactured by American Cyanamid, and contains 27.6 percent imazapyr and 72.4 percent inert ingredients.

Based on acute oral exposures in rats, imazapyr is considered very slightly toxic to mammals. Imazapyr is slightly irritating to the eyes and skin. Available data indicate that imazapyr has no reproductive, teratogenic, or mutagenic effects. No evidence of carcinogenicity has been observed in preliminary oncogenicity studies, but further study is required to determine the herbicide's carcinogenic potential. The technical grade and the Arsenal™ formulation are practically nontoxic to birds and fish. Also, an aquatic invertebrate, the water flea, has been found to be insensitive to Arsenal™.

Microbial decomposition is not important, however, photolysis is significant. Adsorption to soil is strong, and as a result, leaching does not appear to be important. It is completely soluble in water. Soil half-life persistence of imazapyr acid is 90 to 712 days. See Table 3-6.

Mefluidide. Mefluidide suppresses vegetative growth and seedhead development of many plant species, including many turf grasses, grass and broadleaf weeds, and ornamental and nonornamental woody plants. Mefluidide is absorbed through the leaves and inhibits the growth and meristematic regions of affected plants.

Mefluidide is an odorless, colorless, crystalline solid. Embark™, the formulation proposed for use by BLM, is manufactured by the PBI/Gordon Corporation and contains 28 percent mefluidide and 72 percent inert ingredients.

Mefluidide is classified as slightly toxic to mammals. It is nonirritating to skin and causes minimal eye irritation. Oncogenicity and mutagenicity studies indicate that mefluidide is noncarcinogenic and nonmutagenic. For wildlife, mefluidide is of low toxicity to birds and is relatively nontoxic to fish and bees.

Microbial decomposition appears to occur. Photolysis may be important. Adsorption on soil is insignificant. Mobility is probably high. There is incomplete information on persistence although its persistence in soil has a half-life of 2 days. See Table 3-6.

Metsulfuron methyl. Metsulfuron methyl is an herbicide for selective broadleaf weed control in wheat, barley, and reduced-tillage fallow preceding wheat. In noncropland areas, metsulfuron methyl is used as a broad-spectrum herbicide for broadleaf weed and brush control. Metsulfuron methyl is absorbed by foliage and is a growth inhibitor.

Pure metsulfuron methyl is a white-to-pale-yellow solid with a faint, sweet odor. Its melting point is 158° C (316° F), and it is moderately soluble in water. Escort™, a formulation manufactured by Du Pont, contains 60 percent metsulfuron methyl and 40 percent inert ingredients and is proposed for use on BLM lands.

Metsulfuron methyl is classified as very slightly toxic to mammals. Although EPA has not evaluated the human carcinogenic potential of metsulfuron methyl, available data indicate that the herbicide is noncarcinogenic. Mutagenicity studies similarly indicate that metsulfuron methyl is nonmutagenic. Metsulfuron methyl is slightly toxic to birds and practically nontoxic to fish and aquatic invertebrates.

Degradation is through microbial processes and hydrolysis. Photolysis and volatilization are minor degradation processes. Soil half-life persistence is 14 to 180 days. See Table 3-6.

Picloram. Picloram is an herbicide used for general woody plant control and control of most annual and perennial broadleaf weeds. It also may be used to control broadleaf weeds in grass crops. Picloram is absorbed readily by foliage and roots and acts as an auxin-like, growth-inhibiting herbicide.

Picloram is a white powder, with a chlorine-like odor at room temperature. Chemical decomposition occurs before melting temperature is reached. Tordon™ and Grazon™ PC, manufactured by Dow Chemical, are proposed for use on BLM lands.

Based on acute oral exposures in rats, picloram is considered slightly toxic to mammals. It also is a slight eye and very slight skin irritant. Oncogenicity studies have been inconclusive but indicate that picloram may have carcinogenic potential. Consequently, picloram was assumed to be a carcinogen in the herbicide risk assessment conducted for this final EIS. EPA has requested the submission of additional studies for oncogenicity, as well as for teratology and reproduction. Mutagenicity studies, however, indicate that picloram is nonmutagenic. Picloram is slightly toxic to birds, relatively nontoxic to honey bees, and moderately to slightly toxic to aquatic organisms.

Microbial breakdown occurs slowly. Photolysis is an important breakdown process. Adsorption is low, mobility high, and solubility high. Soil half-life persistence of picloram salt is 20 to 277 days. See Table 3-6.

Simazine. Simazine is a widely used selective herbicide for controlling broadleaf and grass weeds in corn, citrus, deciduous fruits and nuts, olives, pineapple, sugar cane, and artichokes. It also is used as a nonselective herbicide for vegetation control in noncropland. Simazine is absorbed rapidly through the roots and inhibits photosynthesis.

Simazine is a white, odorless, crystalline solid with a melting point of 225° to 227° C (437° to 441° F). The formulations proposed for use on BLM lands are Princep™ 80W, Princep™ 4G, and Aquazine™, manufactured by Ciba-Geigy, and Simazine™ 80W, manufactured by the Drexel Chemical Company.

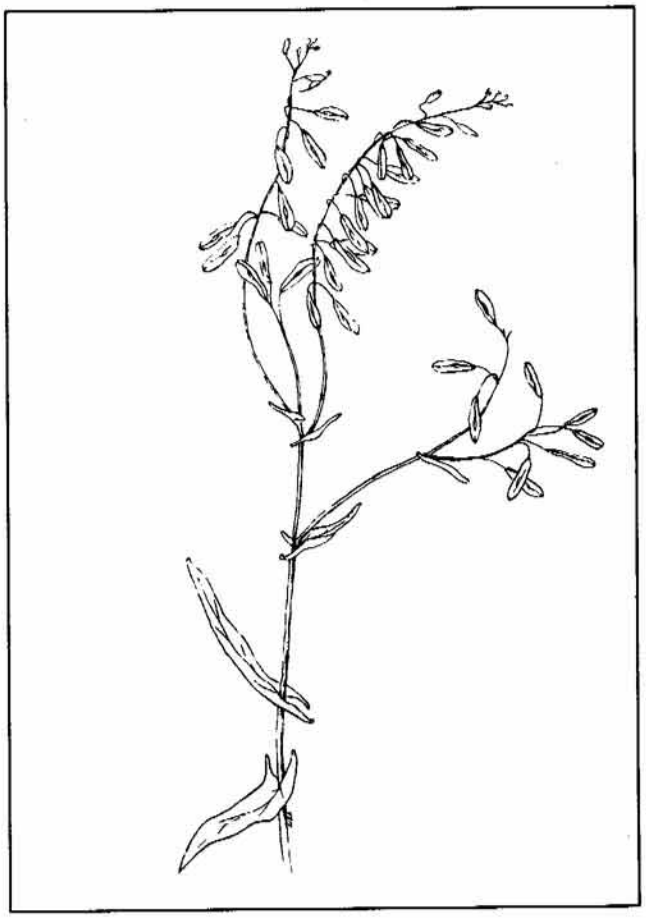
For mammals, simazine is classified as very slightly toxic during acute oral exposure and as moderately toxic for acute inhalation toxicity. The herbicide is slightly irritating to eyes and nonirritating to skin. No teratogenic or reproductive effects have been observed in rats. Based on a 2-year dietary oncogenicity study with rats, EPA has classified simazine as a possible human carcinogen. Thus, simazine was assumed to be carcinogenic in the herbicide risk assessment conducted for this final EIS. Mutagenicity studies indicate that, at worst, simazine poses only a slight mutagenic risk to humans. For wildlife, simazine is practically nontoxic to birds but is moderately to slightly toxic to fish and aquatic invertebrates.

Microbial breakdown is an important process. Adsorption is high on mulch and clay. Mobility is moderate, and its solubility is low at 84 ppm. Soil half-life persistence is 11 to 149 days. See Table 3-6. In ponds the average half-life is 30 days.

Sulfometuron Methyl. Sulfometuron methyl is used as a broad-spectrum herbicide for controlling annual and perennial grasses and broadleaf herbs on noncroplands. Sulfometuron methyl is absorbed easily by foliage and roots and inhibits plant growth.

Pure sulfometuron methyl is a white, odorless solid with a melting point of 203° to 205° C (397° to 401° F). Oust™, manufactured by Du Pont, is a dispersible granule containing 75 percent sulfometuron methyl and 25 percent inert ingredients. This formulation is proposed for use on BLM lands.

Sulfometuron methyl is very slightly toxic to mammals through acute oral exposure and slightly toxic through acute dermal exposure. It is slightly irritating to eyes and skin. No carcinogenic, mutagenic, or teratogenic effects of sulfometuron methyl have been observed in laboratory studies, but decreased reproductive success has been noticed in rats. The herbicide is very slightly toxic to birds, slightly toxic to aquatic organisms, and relatively nontoxic to bees.



Dyer's Woad

Microbial breakdown is significant. Photolysis and volatization are not important. Information on mobility is not available. Solubility is low at 300 ppm. Soil half-life persistence is 20 days. See Table 3-6.

Tebuthiuron. Tebuthiuron is a relatively nonselective, soil-activated herbicide. It has been registered in the United States since 1974 for controlling broadleaf weeds, grasses, and brush in noncrop areas and for spot treatment of woody brush on rangelands and pastures. The herbicide is absorbed readily through the roots of target plants and acts as a photosynthesis inhibitor.

Tebuthiuron is an odorless, colorless solid. The major formulations of tebuthiuron, manufactured by the Elanco Products Company, are Graslan™ and Spike™. Graslan™ and Spike™ are used predominantly on rangelands and noncropland areas.

Based on acute oral exposures to rats, tebuthiuron is classified as slightly toxic to mammals. However, no acute oral toxicity studies have been validated by EPA. Other data gaps exist for acute dermal exposure, skin and eye irritation, and teratology. Available data indicate that tebuthiuron is nonmutagenic and noncarcinogenic. Tebuthiuron is slightly toxic to birds and of relatively low toxicity for bees and other terrestrial invertebrates. Also, this herbicide is practically nontoxic to most fish and invertebrates and slightly toxic to other species.

Microbial breakdown may be important. Adsorption is high on clay and organic matter. Photolysis and volatization are not important. Mobility is considered moderate to high. Soil half-life persistence is 13 to 450 days. See Table 3-6.

Triclopyr. Triclopyr is an auxin-type selective herbicide effective against woody plants and broadleaf weeds. The herbicide is particularly effective against root-sprouting species, including ash and oaks, and is used for brush and weed control on rangelands, industrial sites, permanent grass pastures, and broadleaf and aquatic weed control in rice. However, most grass species are tolerant of triclopyr.

Pure triclopyr is an odorless, white solid. Commonly used formulations of triclopyr are Garlon 3A™ and Garlon 4™, manufactured by Dow Chemical. Garlon 3A™ is a water-soluble triethylamine salt formulation containing 3 pounds of triclopyr acid equivalent per gallon, while Garlon 4™ is an oil-soluble, water-emulsifiable butoxyethyl ester formulation with 4 pounds of triclopyr acid equivalent per gallon. In addition, Grazon ET™, another Dow product, is also proposed for use on BLM lands.

Based on acute oral exposures in rats, technical triclopyr is classified as slightly toxic. However, triclopyr is moderately toxic to guinea pigs. The technical grade is a moderate eye irritant and a slight skin irritant. The Garlon 3A™ and Garlon 4™ formulations also are slightly toxic to mammals, but Garlon 3A™ causes slight to moderate skin irritation and moderate to severe eye irritation. Laboratory data indicate that triclopyr is noncarcinogenic and nonmutagenic. The technical grade and the formulations are slightly toxic to birds and the technical is relatively nontoxic to insects. Various formulations of triclopyr have widely varying toxicities for aquatic organisms; the Garlon 3A™-butoxyethyl ester form is highly toxic to fish, while the technical and Garlon 3A™-triethylamine salt are practically nontoxic.

Microbial breakdown appears to be important. Loss from photolysis is important. Adsorption is not strong and mobility is moderate to high. Solubility is 430 ppm in water. Soil half-life persistence of triclopyr ester is 30 to 90 days. See Table 3-6.

INERT INGREDIENTS

Inert ingredients are chemicals used with the active ingredient in preparing a formulation of an herbicide. Inert ingredients are used to provide a carrier for the active ingredient that facilitates the effective application of the herbicide. Inerts are not intended to supplement an herbicide's toxic properties.

EPA's Office of Pesticides and Toxic Substances has identified about 1,200 inert ingredients that are now used in approved pesticides and has reviewed the existing evidence concerning the toxicity of these inerts, including laboratory toxicity data, epidemiological data, and structure/activity relationships. Of particular concern in reviewing the inerts was their potential for causing chronic human health effects.

Because EPA normally classifies inert ingredients as "Confidential Business Information," the agency does not have to release information on them to the public under the Freedom of Information Act (see also 40 CFR 1506.(a)). Nonetheless, BLM investigated the status of the inerts in the formulations proposed for use in this final EIS by surveying the manufacturers. The Bureau found that none of the herbicides proposed for use, with two exceptions, contain any inert ingredients appearing on either List 1 or List 2. The exceptions are Esteron 99™ and Garlon 4™, which contain a petroleum distillate of high priority for testing. Accordingly, a risk analysis has been conducted on the human health risk from exposure to the petroleum distillate in Esteron 99™ and Garlon 4™.

See Appendix M for a listing of formulations that have been investigated to insure that they contain no inerts on Lists 1 and 2, except as noted above.

MITIGATION

The purpose of this section is to describe protective measures that are being applied on a regular basis for the various types of vegetation treatment. Special mitigation procedures are identified and then required by the authorized BLM officer (manager) as part of the site-specific analysis and appropriate documentation at the time each individual project is considered. This information can be incorporated as appropriate by the local BLM field office, with additional public involvement before BLM takes any treatment action. In addition, each site-specific analysis will include a human health risk management plan for each proposed treatment project, and each treatment proposal would be designed in accordance with BLM and State weed control guides or handbooks that provide up-to-date directions on herbicide application rates, proper mixtures, safety procedures, and important restrictions that meet State and EPA standards.

PROJECT DESIGN FEATURES

Project design features are intended to ensure the proper and safe implementation of treatment methods. This includes proper and safe application of herbicides on BLM lands in the program States as required by Federal, State, and regional procedures. Federal and State laws and regulations set minimum standards to follow when applying herbicides on Government-owned forests and rangelands. Each regional and district office may develop additional restrictions and precautions.

Disposal of hazardous waste from these projects will be minimized in a number of methods. Because a large portion of the pesticide use in BLM is under contract, all contracts will specify that all containers be removed from BLM-administered lands and disposal of these containers under EPA guidelines is the responsibility of the contractor. Where BLM is the applicator, only the amount of pesticide needed for the project is purchased and stored. Guidelines for storage is provided in BLM Manual Section 9011. Excess pesticides should be used for the intended use and any rinsate from pesticide storage cans and equipment should be applied to the project site. Further, guidelines for storage, transportation, and disposal is provided in BLM Section 9011 Handbook, and on the label for specific pesticides.

Some specific examples of project design features include the following:

Herbicide Treatments

(1) Application operations will typically be suspended when any of the following conditions exist on the treatment area:

   (a) Wind velocity exceeds 6 miles per hour for the application of liquids or 15 miles per hour for the application of granular herbicides, or as specified on the label (whichever is less).

   (b) Snow or ice covers the target foliage.

   (c) Precipitation is occurring or is imminent.

   (d) Fog significantly reduces visibility.

   (e) Air turbulence (for example, thermal updrafts) is sufficient to affect the normal chemical distribution pattern.

(2) During air operations, a radio network will be maintained to link all parts of the project.

(3) Equipment will be designed to deliver a median droplet diameter of 200 to 800 microns. This droplet size is large enough to avoid excessive drift while providing adequate coverage of target vegetation.

(4) Individuals involved in the herbicide handling or application will be instructed on the safety plan and spill procedures.

Other general mitigation that pertain to treatment methods and alternatives described in this final EIS are as follows:

(1) Herbicides with high health and safety risks would be limited in use. Other herbicides and other types of treatment that are viable alternatives would be used. Whenever possible, less than maximum application rates will be used that will still meet the needs to effectively control or eradicate target species.

(2) Select herbicides with minimum toxicity to the significantly affected fish and wildlife species in the potentially affected treatment area, while maintaining adequate toxicity to the target plant species.

(3) A preventative maintenance program will be incorporated as part of each project treatment proposal that would help guard against reencroachment of undesired plant or shrub species.

(4) Protective buffer zones will be provided along important riparian habitat not designed to be treated and along streams, rivers, lakes, wetlands, and xeroriparian areas along important dry water courses.

(5) In situations when control of the location of aerial spray is critical, as in buffers to riparian and aquatic areas, and when control of the configuration of the treatment area is necessary for the success of the project (e.g. spraying around meadows and in sagebrush when sage grouse habitat could be impacted), spraying should be accomplished by helicopter.

(6) When significant impacts to fish from application of herbicides are likely, the following mitigation is recommended: a) Application will avoid time periods when fish are in life stages most sensitive to herbicide impacts (egg, larvae, and smolt) in waters adjacent to the application areas; b) Emphasize spot spraying or other methods of treatment near streams, especially important fisheries; c) Reduce frequency and rates of application of herbicides by timing application to the most vulnerable phenological events of the target plant species; d) Select herbicides with minimum toxicity to potentially affected fish and other aquatic wildlife species in the treatment area, or area potentially affected, while maintaining adequate toxicity to the target plant species; e) Minimize use of chemicals that might have adverse impacts on aquatic habitats; f) Establish contingencies through the Safety Plan for immediate reaction and mitigation in the case of accidental spills, unplanned drift, or other serious environmental accidents impacting important streams and water bodies.

(7) Periods of treatment should avoid the bird nesting season and other critical seasons when loss of cover would be critical to wildlife; e.g. during critical reproductive periods and prior to severe winter weather conditions. Application of diesel fuel as a carrier of herbicides, to bird eggs, and young of any wildlife species, should be avoided.

(8) Prior to herbicide applications, any managed apiaries (honey bee colonies) in the vicinity will be notified in advance to allow time for removal or other protection of the hives.

(9) Precautions will be taken to assure that equipment used for storage, transport, and mixing or application will not leak into water or soil creating a contamination hazard.

(10) Helicopter ferrying routes between the staging area and spray area will be planned to avoid flights over aquatic systems and human habitation.

(12) Monitoring of mitigation effectiveness will be conducted.

(13) Areas with high risk for ground water contamination would not likely be included to receive herbicide treatments, particularly if those areas serve as domestic water sources. All areas considered for herbicide application would be evaluated in terms of the EPA's DRASTIC index that estimates the potential vulnerability to ground water contamination. The DRASTIC index uses site factors including soil permeability, underlying geologic characteristics, depth to water, and recharge potential. Generally, an area with a rating above 100 is considered to be of moderate to high risk. Care should be taken to make sure the DRASTIC system is applied properly at the site-treatment level.

If it is determined that high risk areas require herbicide treatment, those areas would be further evaluated to determine the conditions that would allow herbicide application without loss of the herbicide from the root zone. Such analysis (Carsel et al. 1984) would require information on the herbicides solubility, mobility, speciation, and degradation factors. In addition, site recharge would be evaluated to determine areas that may have high recharge zones, such as those where small amounts of precipitation concentrate in a depression because of surface and subsurface runoff. High risk recharge zones would generally not be considered for herbicide treatment.

Project plans would generally include the use of applicable BMPs where they exist. State water quality regulators could review all vegetation treatment plans and environmental analyses.

(14) When application and timing of herbicide spraying could cause a hazard for human consumption of wild game taken by sport hunters, the spray area should be adequately posted to warn hunters of the potential hazard.

(15) When transporting herbicide mixes on forest roads within domestic/municipal, fish hatchery, or irrigation supply watersheds, tanker trucks will use a pilot vehicle. Tanker drivers shall know the Spill Incident Response Plan.

(16) Standards and guidelines in BLM Handbook Section 9011 (Pesticide Storage, Transportation, Spills, and Disposal) Section II will be met. This defines standards for storage facilities, posting and handling, accountability, and transportation. It covers spill prevention, planning, cleanup, and container disposal requirements.

Other Treatments

(1) Treatments such as tilling and chaining will be designed and landscaped to minimize the negative impacts on aesthetic values. In the case of

tree chainings, consideration will be given to salvaging the woodland products and then burning the remaining dead material in an effort to minimize the negative impact on the visual resource.

(2) Irregular boundaries for maximizing edge effect will be incorporated into all methods of treatment. Undisturbed islands of natural vegetation will be left, where appropriate, to minimize negative impacts to the wildlife community.

(3) Especially in the case of mechanical treatment, care will be taken to assure that excessive land slope, unfavorable soil conditions, etc. do not contribute to long-term accelerated erosion conditions. In most cases, treatments should be confined to the more gentle slopes and ideal soil conditions which will generally result in reduced soil erosion.

See Appendix J for references for further discussion of mitigation.

Special Precautions

Special provisions for treatments would be selected according to the scope of the action and the physical characteristics of the specific site. BLM manual sections and handbooks provide a variety of approved standards and special provisions for renewable resource improvements and treatments (BLM 1981a, 1985b, 1985c, 1987b). Periodically, BLM updates recommended proposals for pre- and post-treatments. There are other precautions taken in consideration of special status species, wilderness, and cultural resources, as described below.

Special Status Species

Federal policies and procedures for protecting endangered and threatened species of fish, wildlife, and plants were established by the Endangered Species Act of 1973 (16 U.S.C. 1531 et seq.) and regulations issued pursuant to the act. The purposes of the act are to provide mechanisms for the conservation of endangered and threatened species and the habitats upon which they depend, and to achieve the goals of international treaties and conventions related to endangered species. Under the act, the Secretary of the Interior is required to determine which species are endangered or threatened and to issue regulations for the protection of those species. If any species is determined by the U.S. Fish and Wildlife Service (FWS) to be endangered or threatened, any action that would jeopardize its continued existence would be in violation of the act.

Death Camas

Section 7 of the Endangered Species Act (ESA) (Public Law 97-304) specifically requires all Federal agencies to use their authorities in furtherance of ESA to (a) carry out programs for the conservation of listed species and (b) to ensure that no agency action is likely to jeopardize the continued existence of a listed species or adversely modify critical habitat. This is a nondiscretionary requirement pertaining to the actions of all Federal agencies. BLM policy and guidance establish that species proposed for Federal listing be managed at the same level of protection as listed species except that formal consultation is not required. However, Section 7 conference with U.S. Fish and Wildlife Service is required for "may affect" situations on proposed species (BLM Manual 8440). For Category 1 and 2 candidate species, the BLM shall carry out management consistent with the preservation of the species and their habitats and shall ensure that actions authorized, funded, or carried out do not contribute to the need to list any of these species as threatened or endangered (BLM Manual 6840).

The BLM will strive to maintain optimum habitats for endangered and threatened species on its lands. Approximately 5.5 million acres of BLM managed

lands provide habitat for species that have been listed as endangered or threatened by the FWS. In addition, BLM will consider species that have been declining in abundance—but have not been listed as endangered or threatened (candidate species)—when proposing land management practices. BLM anticipates the addition of 15 to 20 more special status species annually to the list of species that occur on BLM-administered lands because of a backlog at FWS. For a full listing of these special status species in the 13 Western States, see Appendix H.

BLM State Directors may designate sensitive species in cooperation with their respective State. These sensitive species must receive, at a minimum, the same level of protection as Federal candidate species (BLM Manual 6840). BLM shall carry out management for the conservation of State-list plants and animals. State laws protecting these species apply to all BLM programs and actions to the extent that they are consistent with FLPMA and other Federal laws. Where the State governments have designated species in categories that imply local rarity, endangerment, extirpation, or extinction, the State Directors will develop policies to help the State achieve their management objectives for those species (BLM Manual 6840).

Preserving existing habitats, restoring degraded habitats, and participating in recovery planning for these special status species are essential for protecting these populations. BLM is involved with both habitat management and wildlife management for special status species on its lands. Reintroduction programs on BLM-managed lands have been successful for many wildlife species, including the bighorn sheep, the pronghorn antelope, and the American peregrine falcon. Bighorn sheep now exist on a significant portion of their historic range as a result of these efforts (Fish and Wildlife 2000).

Because BLM is committed to mitigating adverse impacts on special status species, land management strategies will be studied on a site-specific basis to determine the effects, if any, on local habitats.

For example, many special status animal species are directly dependent on vegetation for habitat, and any change in the vegetation of a particular plant community is likely to affect the species associated with that community. Therefore, risks to special status animal species must be analyzed and documented before any site-specific action.

All BLM actions will be evaluated for potential impact to State and Federal species. If the evaluation indicates a "no affect" situation, the action may proceed. If the evaluation indicates a "may affect" situation (may affect includes both beneficial and adverse impacts) on a federally listed species and the adverse impacts cannot be eliminated, Section 7 consultation with the FWS must be conducted. BLM does not have the authority to make a "no affect" finding if a "may affect" situation exists. For federally proposed species, a Section 7 conference will be conducted. There are no legal requirements for Federal candidate species other than BLM policy for multiple-use management and to eliminate the need for listing. In general, BLM should be managing all of its programs for the conservation of endangered species to the extent that a jeopardy opinion need never be issued by the FWS or an individual State.

After beginning Section 7 consultation with the FWS on a federally listed species, BLM will not, in accordance with Section 7 of ESA, make any irreversible or irretrievable commitment of resources that would preclude the formulation and execution of a reasonable alternative to solve the conflict.

Wilderness

In wilderness areas, BLM's policy is to allow natural ecological processes to occur and be interfered with only in rare circumstances. BLM does not ordinarily treat vegetation in these areas unless, as in the case of noxious weeds, it is spreading within the wilderness area or to adjacent lands (BLM 1987e).

If vegetation control is found to be necessary in Wilderness Study Areas (WSA) and no effective alternative exists, BLM's policy is to limit its control program to small areas, limit the treatment method to manual or prescribed fire, and limit the area treated. Some actions can occur in WSAs that would not be allowed in wilderness areas, but BLM manages WSAs to avoid impairing their suitability for preservation as wilderness or affect their wilderness values (BLM 1983, 1988d).

Cultural Resources

The effects of BLM actions on cultural resources are assessed and mitigated through consultation among BLM, the Advisory Council on Historic Preservation, and State Historic Preservation Officers through the process defined in Section 106 of the National Historic Preservation Act of 1966, as amended (16 U.S.C. 470), and implemented in 36 CFR 800. These legal mandates require BLM to consider the effects of its actions on historic properties through project-specific inventory to identify significant cultural properties (eligible for inclusion in the National Register of Historic Places) and avoid or mitigate possible direct and indirect impacts to them.

The American Indian Religious Freedom Act of 1979 directs Federal Agencies to ensure that Indian religious rights and freedoms are not unnecessarily disrupted by agency practices. As refined in court cases this means that agencies must obtain and con-

sider the views of Indian leaders when a proposed land use might conflict with traditional Indian religious beliefs or practices. Bureau manuals (BLM 1988e) will be followed in considering traditional beliefs, practices, or other traditional lifeway values.

Whenever evidence of historic or prehistoric occupation is likely to be effected during BLM activities. A cultural resources inventory is required on all areas to be subjected to ground-disturbing activities. This is conducted in the preplanning stage of a treatment, and the results are analyzed in the environmental analysis addressing the action (BLM 1988e).

Impacts to significant cultural properties will be avoided through treatment project redesign or mitigated through data recovery, recordation, monitoring or other measures developed for the specific treatment project. Whenever possible vegetation treatments will be modified to avoid effecting traditional lifeway values, however, it may not be possible to avoid or mitigate all impacts to Indian traditional religious beliefs or practices and other traditional lifeway values.

When cultural resources are discovered during vegetation treatment activities, nearby operations are immediately suspended and may resume only upon receipt of written authorization from the BLM-authorized officer.

Tansy Ragwort

SUMMARY OF IMPACTS BY ALTERNATIVE

A comparison of the impacts of the treatment program alternatives is presented in Table 1-9. Although these impacts are described in detail in Chapter 3, the table is provided to assist decisionmakers and reviewers by concisely summarizing the major impacts.

IMPLEMENTATION

Monitoring

All projects would be monitored to ensure that treatments are conducted in accordance with BLM procedures (BLM 1984c, 1984d). Manual and mechanical treatments would be monitored at regular intervals to determine the quality and quantity of completed work. Prescribed burns and chemical treatments would be monitored in progress for compliance to proper application technique, burn prescriptions, and safety procedures. Effectiveness of mitigating measures identified in project-specific environmental documents will be monitored through periodic inspections. Air quality would be monitored where appropriate. Post-treatment monitoring is essential to determine whether treatment objectives have been met and if the treatment was successful. Such monitoring will vary in intensity, and in some cases may consist of nothing more than visual inspection.

In other cases, monitoring will continue for some years after treatment in order to evaluate the full measure of response. Many rangeland treatments would have studies established in them to monitor treatment effects on vegetation as well as on other resources such as wildlife or water quality, depending on treatment objectives and affected resource values.

Table 1-9

Summary of Impacts by Alternative

Resource Elements	Alternative 1 (Proposed action)	Alternative 2 (No Aerial Application of Herbicides)	Alternative 3 (No Use of Herbicides)	Alternative 4 (No Prescribed Burning)	Alternative 5 (Continue Present Management)
Vegetation	Overall effect would be to achieve desired plant communities on treated sites, create stratified age structure dynamics in some shrublands for wildlife habitat improvement, reduce hazardous fuel buildup, reclaim certain areas to native perennial vegetation, reduce populations and spread of noxious weeds, remove vegetation that was a potential hazard to recreationists, and maintain safe conditions in rights-of-ways and oil and gas facilities. Specific areas of some shrub-dominated rangeland communities would have higher production of herbaceous vegetation mixed with shrubs. Greatest number of options for treatment method allow greatest management flexibility.	Overall effect would be fewer areas on which desired plant community objectives were met in desired timeframes. Less acreage would be treated chemically than Alternative 1, but more acreage would be burned. Less management flexibility to select most appropriate and cost-effective treatment for rangeland situations, but smaller-scale treatments of oil and gas facilities, rights-of-ways, recreation areas, riparian areas, and most noxious weed infestations would not be greatly affected.	Overall effect would be fewer areas on which desired plant community objectives were met in desired timeframes than both Alternatives 1 and 2. Less management flexibility to select most appropriate and cost-effective method in all situations when vegetation treatment is proposed. Noxious weed control would be ineffective for species which had no biological control agents, making public lands an infestation source for adjacent lands under other ownership. Ineffectiveness of alternative treatments would create safety hazards to oil and gas facility sites and rights-of-way, and some recreation sites. Saltcedar control in riparian areas would be much less effective than under Alternative 1. High use of prescribed fire would continue to affect both target and nontarget species.	Overall effect would be fewer areas on which desired plant community objectives were met in desired timeframes than both Alternatives 1 and 2. Less management flexibility to select most appropriate and cost-effective method in all rangeland situations. Highest level of chemical use of all alternatives. Higher probability of catastrophic wildfire. Long-term undesirable effects in all vegetation analysis regions where fire has played a historic ecological role.	Overall effect would be fewer areas on which desired plant community objectives were met in desired timeframes than Alternative 1. Noxious weed control would be less effective than Alternative 1, but more effective than Alternative 3. Less acreage treated chemically than any alternative except Alternative 3.
Climate and Air Quality	Moderate, short-term increases in smoke, exhaust, and drift expected; however, standards would not be violated. Temporary, localized noise from aircraft and equipment.	Suspension of aerial operations reduces risk of herbicide drift; increase in visible smoke and particulates with increase in prescribed burning. Standards would not be violated.	Elimination of drift from chemical treatment. Impacts of visible smoke and particulates from prescribed burning greater than Alternatives 1 and 2. Standards would not be violated.	Elimination of prescribed burning increases chemical treatment and subsequent herbicide drift. Smoke from wildfires would increase. Standards would not be violated.	Slightly less impact than Alternative 1. Standards would not be violated.

Table 1-9 (Continued)

Summary of Impacts by Alternative

Resource Elements	Alternative 1 (Proposed action)	Alternative 2 (No Aerial Application of Herbicides)	Alternative 3 (No Use of Herbicides)	Alternative 4 (No Prescribed Burning)	Alternative 5 (Continue Present Management)
Geology and Topography	No impacts to geology and topography.	No impacts. Same as Alternative 1.	No impacts. Same as Alternative 1.	No impacts. Same as Alternative 1.	No impacts. Same as Alternative 1.
Soils	Short-term decreases in soil productivity and increases in erosion; long-term stabilization.	More erosion likely than under Alternatives 1, 4, and 5.	More erosion likely than under Alternatives 1, 2, and 4.	Slightly more erosion likely from mechanical treatments than under Alternative 1. Fewer overall impacts due to no burning.	Less impacts on short-term soil-productivity losses and increased soil erosion than Alternative 1.
Aquatic Resources	Short-term erosion and sedimentation from mechanical and prescribed burning treatment. Unlikely that any significant amount of herbicides will be introduced into streams or ground water.	About the same as Alternative 1; more noticeable short-term impacts to perennial and ephemeral streams due to the greater amount of mechanical treatment. However, this alternative would reduce the possibility of herbicides drifting onto surface water.	Control of target species would have highest short-term erosion impacts to water resources due to the greater amount of mechanical treatments. Totally eliminates the potential risk of surface and ground water contamination from herbicides.	About the same as Alternative 1; more noticeable impacts to water resources due to the greater amount of mechanical treatments. More impact from herbicide drift than any alternative.	Overall impacts due to all treatments would be less than Alternative 1, because total acreage treated is likely to be less.
Fish and Wildlife	Potential impacts to fisheries or riparian resources, but none with proper mitigation. Greatest potential impacts, both beneficial and adverse, to terrestrial wildlife resources and habitats of all alternatives. Largest acreages of current existing habitats would be disturbed. Both short-term and long-term impacts to individual wildlife species would occur.	Less potential for adverse impacts to fisheries or riparian resources than Alternative 1. No potential for adverse impacts from aerial application of herbicides, some potential remains from ground applications. More competition from noxious weeds. Best ratio of high potential for beneficial impacts, with a reduced potential for adverse impacts, of all alternatives.	No impacts to fisheries and riparian from herbicides, but potential is increased for impacts from escaped prescribed burns. All herbicide impacts eliminated. Some beneficial projects eliminated. Fewer acres of current habitats disturbed than in Alternatives 1, 2, and 4. Most adverse impacts from uncontrolled noxious weeds. The only effective tool for saltcedar control is eliminated.	Greatest potential adverse impacts and least beneficial impacts to fisheries and riparian resources. Most practical and cost efficient vegetation and habitat treatment and clean-up tool eliminated. Greatest potential adverse impacts from herbicide application. Least beneficial alternative to the wildlife resource.	Fewest acres treated of all alternatives. Least potential adverse impacts. Limited opportunity for beneficial impacts from well designed habitat improvement projects.

Table 1-9 (Continued)

Summary of Impacts by Alternative

Resource Elements	Alternative 1 (Proposed action)	Alternative 2 (No Aerial Application of Herbicides)	Alternative 3 (No Use of Herbicides)	Alternative 4 (No Prescribed Burning)	Alternative 5 (Continue Present Management)
Cultural Resources	Low probability of site damage because fewer acres are treated than with manual or mechanical methods. Possibility of chemical contamination of sites.	Slightly higher probability of damage to sites than Alternatives 1, 4, and 5.	Higher probability of damage to sites than Alternatives 1, 2, and 4.	Slightly higher probability of damage to sites than Alternative 1.	Less impacts than Alternative 1.
Recreation and Visual Resources	Short-term impact to quality of scenic values. Recreation areas infested with noxious weeds and poisonous plants would benefit from decreased visitor exposure to adverse effects from these species.	About the same impacts as under Alternative 1. Slightly increased risk of recreational exposure to noxious weeds and poisonous plants than under Alternatives 1 and 4.	Visual impact is about the same as under Alternative 1. More untreated acres than under Alternatives 1, 2, and 4. Spread of noxious weeds and poisonous plants would increase exposure of recreationalists to detrimental effects if nonchemical measures fail to control these species.	About the same as under Alternative 1. Increases use of other treatment methods that can result in negative effects to these resources on some sites.	Slightly less impacts than under Alternative 1, but less control of poisonous plants at recreation sites.
Livestock	Livestock will benefit from positive impacts, particularly increases in available forage. Livestock not likely to be adversely affected.	About the same as Alternative 1.	Some noxious weeds and toxic plants would not be controlled, thereby reducing the quality of livestock forage.	Significant reduction in forage on sites where burning is the most desirable treatment method.	Same as Alternative 1, but lower forage production.
Wild Horses and Burros	Wild horses and burros may benefit from improved vegetation diversity and reduction in unpalatable species.	About the same as Alternative 1.	Some noxious weeds and toxic plants would not be controlled and could reduce overall quality of forage.	Possible significant reduction in available forage.	Same as Alternative 1, but lower forage production.
Special Status Species	Site-specific analysis and consultation will ensure that no special status species are affected.	Same as Alternative 1.	Same as Alternative 1.	Same as Alternative 1.	Same as Alternative 1.
Wilderness and Special Areas	Undesirable vegetation in wilderness areas and WSAs may be controlled, improving competition among native plants in the natural ecosystem.	About the same impacts as under Alternative 1.	Impacts would be the same as under Alternative 1 except when nonchemical measures do not sufficiently control noxious weeds.	Eliminates closest natural treatment method where others are prohibited.	Slightly less impacts than under Alternative 1.

Table 1-9 (Continued)

Summary of Impacts by Alternative

Resource Elements	Alternative 1 (Proposed action)	Alternative 2 (No Aerial Application of Herbicides)	Alternative 3 (No Use of Herbicides)	Alternative 4 (No Prescribed Burning)	Alternative 5 (Continue Present Management)
Human Health and Safety	Public could be affected by amitrole. Workers may be affected by a number of herbicides. Minor risk to workers from manual and mechanical methods and prescribed burning. Smoke may affect sensitive members of the public. However, human health would benefit from treatment of noxious weeds and poisonous plants that adversely affect humans.	Hazards of manual, mechanical, and prescribed burning treatment methods would increase compared to Alternative 1. Less likelihood of adverse herbicide-related impacts. More untreated acreage than under Alternative 1 increases possibility of adverse effects of noxious weeds and poisonous plants.	More potential for adverse impacts from manual, mechanical, and prescribed burning than under Alternatives 1 and 2 because more acres are treated with these methods. No risk of hazards from chemical treatment. Less control of weeds hazardous to human health than in Alternatives 1, 2, and 4.	Risk of adverse effects of manual or chemical treatment greater than under Alternatives 1, 2, and 3. Slightly greater potential for impacts from mechanical treatment than Alternative 1.	Less impacts than under Alternative 1.
Social and Economic	Lower per-acre treatment cost than Alternatives 2, 3, or 4. Any increase in employment would be insignificant; the number of new jobs would be greater than Alternative 4 but less than Alternatives 2 or 3.	Higher per-acre treatment cost than Alternatives 1, 3, and 5. Any increase in employment would be insignificant; however, the number of new jobs would be greatest under this alternative and Alternative 3.	Higher per-acre treatment cost than Alternatives 1 and 5. Any increase in employment would be insignificant; however, the number of new jobs would be greatest under this alternative and Alternative 2. More socially desirable to some populations.	Higher per-acre treatment cost than all other alternatives. Any increase in employment would be insignificant; fewer new jobs would be expected under this alternative than under Alternatives 1, 2, and 3. Eliminates a more favorable treatment tool to some.	Lowest per-acre treatment cost. No new employment.

Requirements for Further Environmental Analysis

This FEIS is a programmatic statement describing the impacts of treating vegetation on BLM-administered lands in 13 Western States. Site-specific environmental analyses and documentation (including application of categorical exclusions where appropriate) on proposed vegetation control plans may be prepared on an individual project level at the district or resource area level in accordance with vegetation mangement objectives established in the land-use planning process. During site-specific analysis and documentation, public involvement will occur in accordance with the CEQ Regulations for implementing NEPA.

Interdisciplinary impact analyses will be based on this and other applicable EISs, including those for land-use plans, timber management programs, and grazing management programs. If later analysis finds a potential for significant impacts not already described in an existing EIS, a supplement or another EIS may be required.

INTERRELATIONSHIPS

BLM coordinates its weed and undesirable plant treatment activities with actions of related Federal and State agencies responsible for resource management and with adjacent landowners and managers. This section briefly describes major interrelationships that would be involved in a vegetation treatment program.

Other Federal Entities

BLM coordinates specific projects and programs with other land management agencies, such as the U.S. Fish and Wildlife Service, the National Park Service, and Soil Conservation Service when proposed actions may affect areas adjacent to resources managed by these agencies.

EPA

The Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), as amended (7 U.S.C. 136 et seq.), establishes procedures for the registration, classification, and regulation of all pesticides. EPA is responsible for implementing FIFRA; primary enforcement responsibilities for use-related violations are assigned to States with approved programs.

Before any pesticide may be sold legally, it must be registered by EPA. EPA may classify a pesticide for unrestricted use if it determines that the pesticide is not likely to cause unreasonable adverse effects on applicators or the environment. EPA's determinations are based on research data supplied by the applicant for registration. States may classify pesticides for restricted use (which means they may be applied only by or under the direct supervision of a certified applicator or in accordance with other restrictions), even though EPA may not have done so. All the herbicides considered in this risk assessment are registered with EPA, and their label rates, uses, and handling instructions must be complied with according to Federal law.

BLM actions also will comply with other environmental legislation, such as the Clean Air Act, as amended (42 U.S.C. 1857 et seq.), the Clean Water Act, and the Safe Drinking Water Act (42 U.S.C. 300(f) et seq.). The Clean Air Act sets national primary and secondary ambient air quality standards, requires that specific emission increases be evaluated to prevent a significant deterioration in air quality, and provides EPA with authority to set national standards for performance of new stationary sources of air pollutants and standards for emissions of hazardous air pollutants. The Clean Water Act requires all branches of the Federal Government involved in an activity that may result in a point source discharge or runoff of pollutants to water to comply with applicable Federal, State, interstate, and local requirements concerning the control and abatement of water pollution. The Safe Drinking Water Act allows EPA to designate any aquifer that serves as the principal source of drinking water for an area as a "sole source" aquifer. Federal agencies are prevented from granting assistance to any project that may contaminate such an aquifer and thus create a significant health hazard.

U.S. Fish and Wildlife Service

Federal policies and procedures for protecting endangered and threatened species of fish, wildlife, and plants were established by the Endangered Species Act of 1973, the Migratory Bird Treaty Act (16 U.S.C. 703-711), as amended, and the Fish and Wildlife Conservation Act of 1980 (16 U.S.C. 2901 et seq.). BLM vegetation treatment activities would be conducted in accordance within the guidelines established in these acts.

Section 7 of the Endangered Species Act requires Federal agencies to consult with the U.S. Fish and Wildlife Service or the National Marine Fisheries Service to ensure that any action that they authorize, fund, or carry out is not likely to jeopardize the continued survival of a listed species or result in the

adverse modification or destruction of its critical habitat (16 U.S.C. 1536 (a)(2)). In addition, the act requires that if species proposed for listing are likely to be jeopardized, a conference must be held with the U.S. Fish and Wildlife Service. This consultation may result in modification or abandonment of an action.

Consultations with the U.S. Fish and Wildlife Service and State agencies are encouraged by the Migratory Bird Treaty Act, if project activities could directly or indirectly harm migratory birds. If the U.S. Fish and Wildlife Service determines that migratory birds could be harmed, a site-specific assessment and mitigation would be developed to prevent harm to these species.

The Fish and Wildlife Conservation Act encourages Federal agencies to conserve and promote conservation of nongame fish and wildlife and their habitats to the maximum extent possible within each agency's statutory responsibilities.

National Park Service

The National Park Service administers national parks, monuments, and recreation areas to conserve the scenery, natural objects, and wildlife (16 U.S.C. 1). The National Park Service also administers the Nationwide Rivers Inventory as provided for in the Wild and Scenic Rivers Act of 1968 (16 U.S.C. 1271 et seq.). BLM will consult with the National Park Service if vegetation treatment actions are proposed on BLM lands adjoining land or rivers administered by the National Park Service.

Advisory Council on Historic Preservation (ACHP)

Section 106 of the National Historic Preservation Act of 1966, as amended (16 U.S.C. 470) requires Federal agencies to consult with the ACHP in order to take into account the effects of Federal undertakings on historic properties. The views of the ACHP relative to historic resources are considered in project specific consultation documents as defined at 36 CFR 800 and in state specific programmatic agreements.

Native Americans

The American Indian Religious Freedom Act (42 U.S.C. 1996) provides for the protection and preservation of the rights of the American Indians to express and exercise tribal religious beliefs. Sites identified or suspected to be sacred to one or more tribes could be present on or adjacent to proposed treatment sites. Tribal governments will be consulted to determine whether the treatment area is of religious significance.

The views of Tribal governments relative to an area's traditional religious or cultural significance will be considered in project specific consultation documents as defined at 36 CFR 800 and in state specific programmatic agreements.

State and Local Governments

BLM's vegetation treatments would be conducted in accordance with applicable State and local government regulations, including the Sikes Act (16 U.S.C. 670 et seq.), as amended, the Federal Land Policy and Management Act (FLPMA), and the National Historic Preservation act of 1966 (NHPA).

The Sikes Act authorizes USDI, in cooperation with the State agencies responsible for the administration of fish and game laws, to plan, develop, maintain, and coordinate programs for the conservation and rehabilitation of wildlife, fish, and game on public lands within its jurisdiction. The plans must be consistent with any overall land-use and management plans for the lands involved and could include specific habitat improvement projects and related activities and adequate protection for species of fish, wildlife, and plants considered endangered or threatened.

The FLPMA (Section 202 (c)(9)) requires BLM to develop resource management programs consistent with those of State and local governments to the extent that such BLM programs also are consistent with Federal laws and regulations. The act also requires BLM to provide for compliance with applicable pollution control laws, including State and Federal air and water pollution standards or implementation plans.

Section 106 of the National Historic Preservation Act of 1966, as amended (16 U.S.C. 470) requires Federal agencies to consult with State Historic Preservation Officers (SHPOs) and local governments in order to take into account the effects of Federal undertakings on historic properties. The views of the SHPO and affected local governments relative to historic properties are considered in project specific consultation documents as defined at 36 CFR 800 and in state specific programmatic agreements.

State and county weed control laws place responsibility for noxious weed control on individual landowners, including the Federal Government. Permittees and grantees operating within rights-of-way on BLM-administered land are required to comply with USDI herbicide-use regulations.

BLM also must coordinate with appropriate State agencies in management of State-listed plant and animal species when a State has formally made such designations.

Private Landowners

Private landowners are highly interested in BLM operations near their land, and BLM strives to keep these landowners informed about its vegetation treatment operations through coordination, cooperation, and consultation. Before preparing environmental documents at the State, district, or resource area level, BLM invites interested landowners to comment on proposed programs.

Limitations of This Final EIS

This EIS is a programmatic document that addresses environmental impacts at a fairly general level because of the broad land area over which those impacts might occur. Impacts at particular vegetation treatment sites may be assessed in environmental analyses tiered to this document, but those impacts should be no more severe than the most severe impacts discussed in this document.

The analyses of impact in this study are based on the most recent information available, particularly in the areas of mechanical treatments, prescribed burning, and herbicide effects on the vegetation, soils, and wildlife of major rangeland plant communities. The descriptions of mechanical, prescribed fire, and herbicide treatment impacts on soils, vegetation, and wildlife were prepared after a comprehensive review of the literature. Chapter 3, Environmental Consequences, presents considerable detail in these areas, but the level of detail was considered appropriate because the program is so broad in scope and the document needs to serve the requirements of the field people preparing the environmental analyses.

The human health and nontarget species herbicide risk assessment was based on the most recent available information concerning herbicide toxicity and environmental fate properties. The analysis was designed to consider a wide range of possible exposures and the resultant effects those exposures might cause, so it includes typical and worst case scenarios that involve routine applications and accidents. The doses that members of the public actually receive are not likely to be as high as most of the doses estimated in this analysis; in fact, in most herbicide applications on these remote sites, no member of the public is likely to be exposed at all.

Chapter 2

Affected Environment